DECEMBER, 1945

Railway Engineering and Maintenance

CHRISTMAS *and* TRAINS GO TOGETHER!

PHOTO COURTESY THE LIONEL CORPORATION

Railroading is always close to the hearts of American boys and men. In the glow of Christmas, when families gather for fun and feast, the toy railroad is a center of interest for young and old. For railroads are an exciting, romantic part of our civilization. Their history is the history of the nation. Their work keeps millions on farms, in factories, offices . . . everywhere . . . busy.

Let's encourage model railroaders. Their pastime interest may well lead to a lifetime loyalty in railroad work.

EATON
EATON MANUFACTURING COMPANY
MASSILLON, OHIO

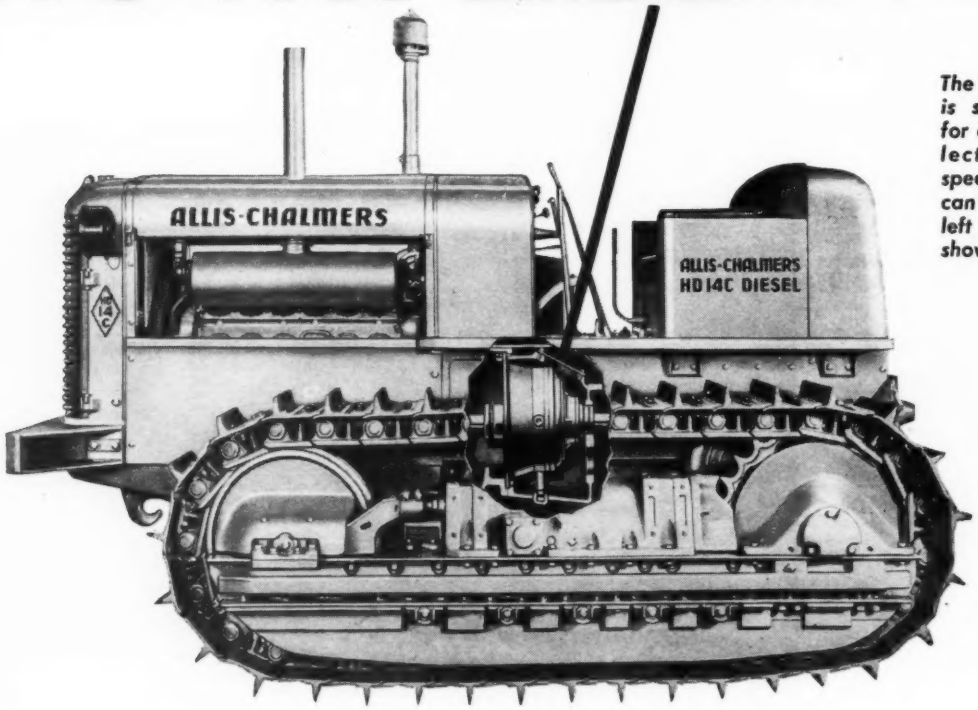
LOCOMOTIVE
HY-CROME
"Tension There - in Spite of Wear"

Reliance Division

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933 at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 105 W. Adams St., Chicago 3, Ill.

NOW.. A TORQUE CONVERTER TRACTOR



The torque converter is simply a device for automatically selecting maximum speed at which load can be moved. At left is cutaway view showing location in tractor.

ALLIS-CHALMERS MEETS THE NEED

Here it is . . . the tractor of the times . . . torque converter driven . . . tried, tested, proved over the last five years on every type of construction work . . . now in full production! It's revolutionary — different from any tractor you've ever seen . . . amazing, the way it smooths out and steps up tractor performance.

25% MORE WORK is accomplished because horsepower output of engine is held near maximum — the torque converter balances tractor speed with load to give maximum operating speed at all times. This means many more yards moved.

LESS GEAR SHIFTING, less operator fatigue, because the torque converter instantly, automatically does, in effect, what the operator of a conventional tractor accomplishes when he shifts gears — makes available the necessary pull or push to handle the load. The engine cannot be overloaded or stalled — keeps running even when an extreme overload pulls tractor to a standstill.

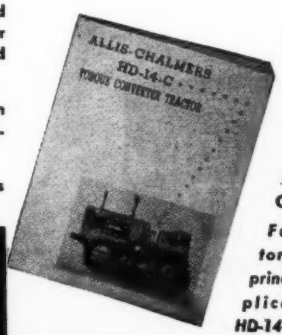
SMOOTHER OPERATION — longer tractor life and longer life of auxiliary equipment is assured by smoother operation. There is gradual acceleration and even application of power — of particular advantage in lengthening the life of cable.

CUSHIONED PROTECTION — cushion of oil eliminates solid contact between engine and power train, protecting all parts of tractor and auxiliary equipment against shock and abuse.

MORE ACCURATE CONTROL — operator can inch into any desired position smoothly, gradually, safely.

SIMPLIFIED DRIVE — the torque converter is a simple mechanism, only two moving parts separated by a cushion of oil. In addition, transmission is simplified — three forward speed ranges cover every need, with operation in any gear from zero to maximum — up to 2.89, 3.61, 7.13 m.p.h. . . . to 3.36 m.p.h. reverse.

You will want to investigate these and the many other advantages of this revolutionary, money-making Diesel tractor. Get all the facts from your Allis-Chalmers dealer.



FREE

Write for this book:

"Allis-Chalmers HD-14-C Torque Converter Tractor"

Fully explains torque converter principle and its application to the HD-14-C.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Let Us Prove That
FLEX-TOE
Will Save Money For You . . .

MADE BY THE MANUFACTURERS OF THE FAMOUS DEVIL LINE OF TRACK TOOLS

Two Men Can Do the Work of Three

The Flex-Toe Claw Bar pulls spikes without spike maul driving. The bar is thrown onto spikes or bolts in the conventional way and movable toes grab hold and tighten their grip as pressure is applied to the handle. No shimming necessary. There's nothing new to learn.

Do You Believe In Signs?

Flex-Toe is the SAFEST claw bar on the market. With it, you can *back up* your safety signs and *better* your accident reports. Flex-Toe will reduce to a minimum your injuries from spike maul driving, from flying spike heads, and from falls. Here is an easy way to avoid costly casualties.

One Man, No Helper Necessary

Since spike maul driving is unnecessary, since Flex-Toe pulls brine-eaten and headless spikes, and since no shimming is needed, this tool is rightly called a ONE-MAN CLAW BAR. And remember, no helper is necessary. With it your spike-pulling costs will hit a new low.

Pulls Headless and Brine-Eaten Spikes

All spikes and bolts COME OUT. The movable toes grab hold of any piece of protruding metal, and the spikes, which otherwise would be left in, or driven through, are removed with no more effort than pulling an ordinary spike. *Ties last longer* and your maintenance costs are reduced. Write today for prices.

WARREN TOOL CORPORATION • WARREN, OHIO

✓Check

these 3 points before you specify

FOUNDATION PILES

1 ***Can they be quickly, easily, economically driven with average job equipment? TAPERED, FLUTED MONOTUBES CAN.***

2 ***Can you extend them quickly, easily in the field, even in low head room—eliminating the need for extensive tests for length, keeping "cut-off" waste to a minimum? THIS IS ONE OF MONOTUBES' PRINCIPAL FEATURES.***

3 ***Are they hollow, tubular to permit quick, easy, sure inspection, top to toe, prior to concreting? MONOTUBES ARE.***

FOR BRIDGES, HIGHWAYS, BUILDINGS, MARINE CONSTRUCTION, AIRPORTS

Extra Plus Values

Fluted steel Monotubes have the enthusiastic endorsement of skilled, experienced engineers and contractors all over the country. Monotubes are available in gauge, size and taper to meet varying requirements. Their light weight speeds handling, helps keep costs down. Complete details, catalog, free on request to The Union Metal Mfg. Co., Canton 5, Ohio.

UNION METAL

Monotube Tapered Piles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SHORT LINE CONSTRUCTION
ARE THESE some of the jobs that are bothering you?
BRIDGE CONSTRUCTION
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PILE DRIVING
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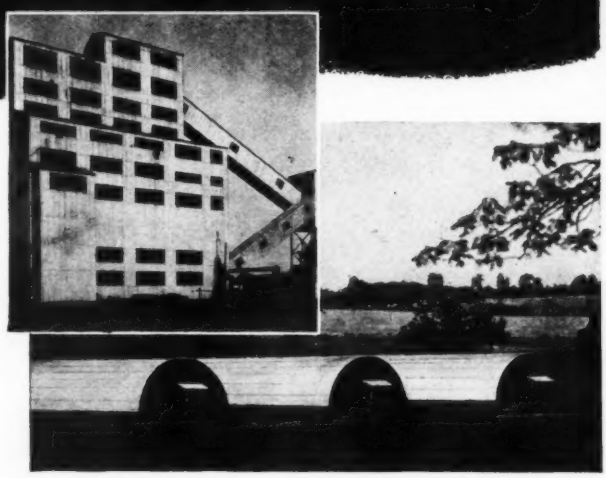
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

It's the ZINC *that Stops the Rust!*



ALL credit to steel, a staunch and strong building material! It's worthy of the best protection you can give it—and the U. S. Bureau of Standards says ZINC is "by far the best protective metallic coating for rust-proofing iron and steel"... So long as steel is coated with zinc, it can not rust; and since the life of a zinc coating is *at least* proportional to its thickness, the heavier the coating, the longer it will protect the underlying steel.

Cut Costs! Save Material! Reduce Maintenance!... with ZINC

It is sound sense and simple economy to use zinc wherever possible for the protection of iron and steel—in buildings, in equipment, in machinery. Good design that includes zinc-protected steel will cut costs, not only in the original saving of material but also in subsequent maintenance. Heavy zinc coatings insure greater durability and longer service life—that is a demonstrated scientific fact; so for economy, *specify heavy coatings.* They cost but little more, yet pay enormous dividends in greatly increased durability and reduced maintenance costs.

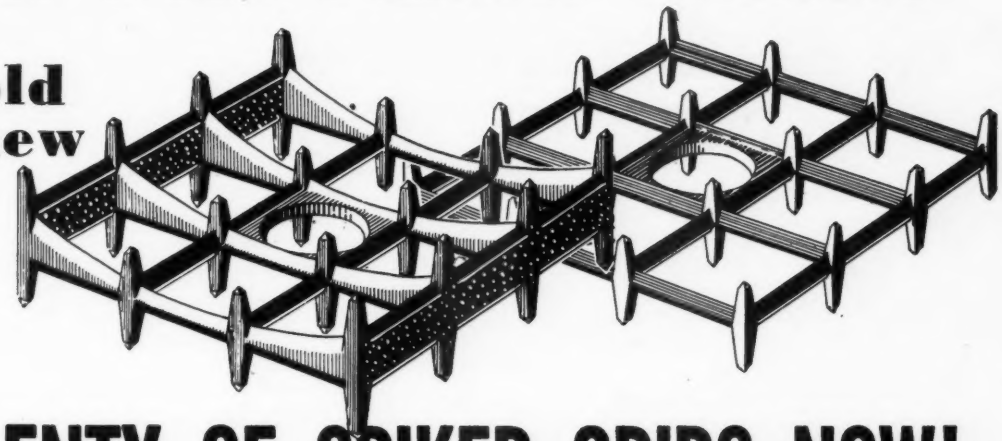
Interesting and Valuable Information About Zinc

We want you to know more about zinc. Won't you please send us your name and address and let us mail you, without charge, these interesting and valuable booklets? Your address on a postal will do.

American Zinc Institute
INCORPORATED
60 East 42nd Street, New York 17, N.Y.

For Your Timber Trestles

. . . old or new



PLENTY OF SPIKED GRIDS NOW!

TECO spiked grids, both curved and flat, for bracing joints of bridges, trestles and wharves are now available for immediate shipment.

You can now specify TECO Grids in your standard plans and be assured of quick delivery. Installed at critical points in a trestle, the Grids will give the structure a marked increase in rigidity even with today's heavier and faster-moving rail traffic.

During the War years when maintenance was curtailed and the use of materials restricted, some railway trestles were repaired by merely reinforcing the joints with spiked grids which effectively increased the rigidity of old structures. Ineffective bolt bracing with enlarged holes was corrected by the installation of Grids because the snug-fitting connectors transferred the load from one member to another distributing the stress over a much larger cross-section of the wood.

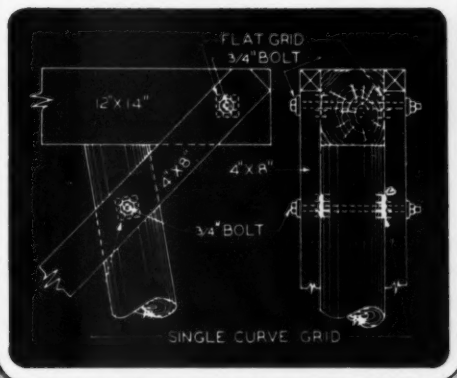
Specify TECO SPIKED GRIDS for your trestle bracing.

Watch for Announcement of New Booklet "Timber Connectors for Timber Construction in Railroad Service."

The Engineering Departments of Fifteen Class 1 Railroads have already used TECO SPIKED GRIDS for trestle bracing.

They are now specified in the standard plans for timber structures by many leading Roads. The recommended trestle designs of the A.R.E.A. show the grid as a typical connecting device for properly framed trestles.

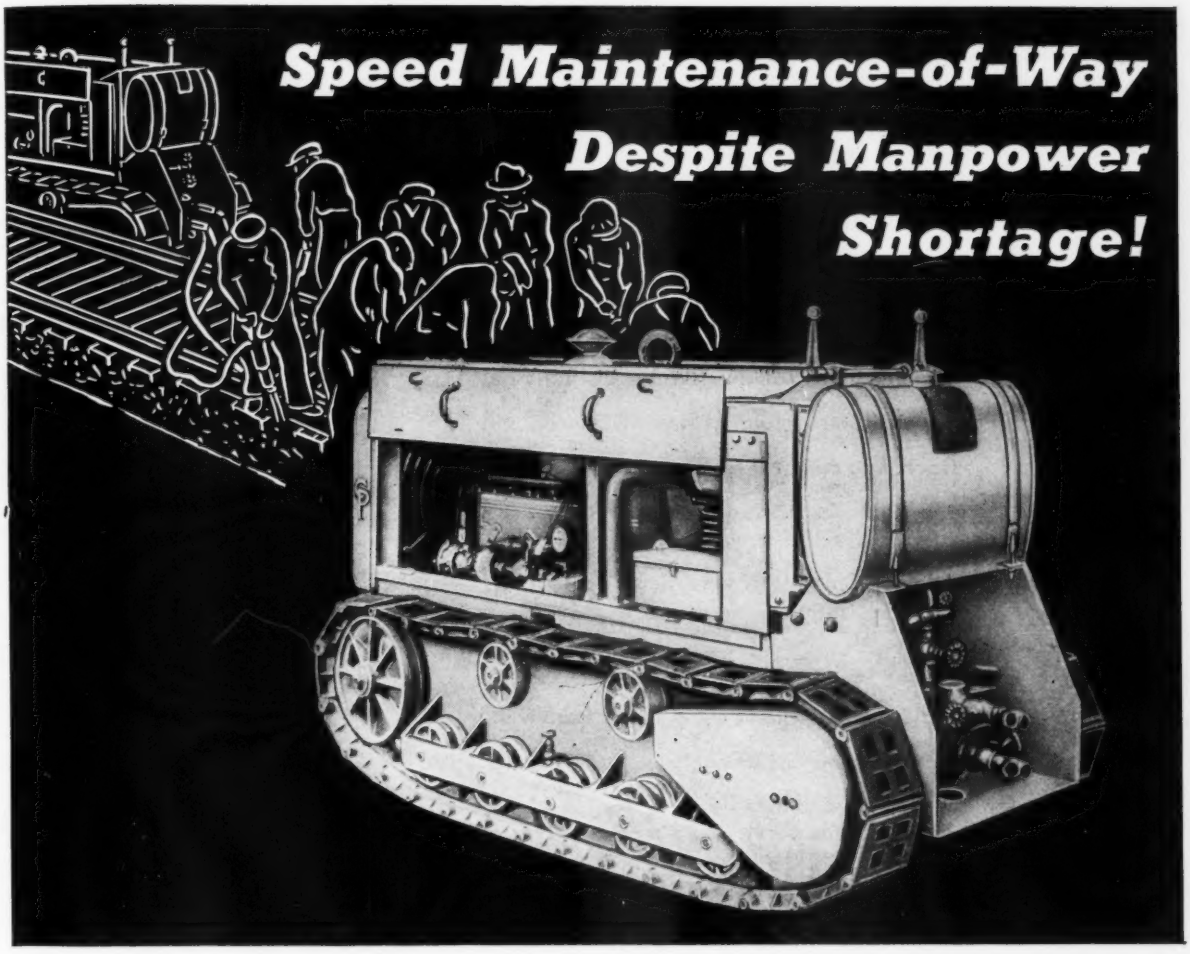
The section below showing the use of the grids in bracing is from a recommended design of the A.R.E.A.



Timber Engineering Co., Inc. of Washington, D. C.

Washington • Chicago • New Orleans • San Francisco

SPECIFY TECO CONNECTORS • SPLIT RINGS • SHEAR PLATES • GROOVING TOOLS



CP TWO-STAGE, AIR-COOLED CRAWLER COMPRESSOR

PROPELLING itself in either direction, or onto a flat or hand car, the CP Crawler Compressor travels between or across rails — or on track shoulder. Turning around on its own center, this sturdy compressor climbs grades up to 40% — and will not tip over at 45° angle. CP Crawler Compressors are made in sizes of 105 and 160 c.f.m., actual capacities, to operate 8 or 12 CP Tie Tampers, respectively. Chicago Pneumatic Tie Tampers are noted for their ease of handling and their low air consumption — excellent for "nipping" and equally efficient on jobs where the track is raised several inches. Write for further information.

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PNEUMATIC TOOLS
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AIR COMPRESSORS
VACUUM PUMPS
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AVIATION ACCESSORIES

PLAN YOUR 1946 WEED CONTROL PROGRAM *Now!*

WEED-FREE TRACK is always a mark of good maintenance. Call on us to help you lay out a weed control program that will insure clean track. We can now make plans on the use of the right chemicals to suit your conditions.

Atlacide Chlorate Weed Killer is again freely available, as well as the old standby Atlas "A." We shall be glad to discuss any special requirements with a view to providing the most effective chemicals to fit your program.

Early planning will insure prompt supply of materials and a satisfactory job throughout.

Chipman Standard Spray Train in action

CHIPMAN CHEMICAL COMPANY, INC.

Chicago, Ill. · BOUND BROOK, NEW JERSEY · Portland, Ore.

Houston, Texas · Palo Alto, Calif. · No. Kansas City, Mo. · Winnipeg, Man.

MEMBER

YOU'LL SAVE MONEY

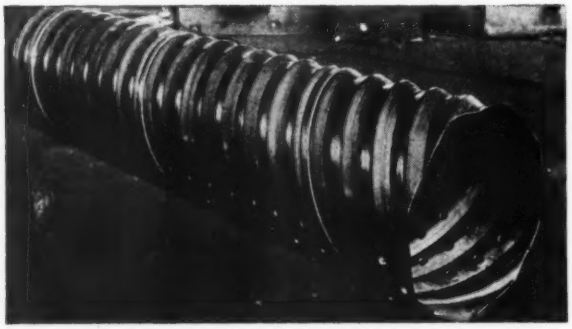
With These Service-Tested Products For Every Drainage Need

Pictured on these pages are some of the Armco drainage products that can help you cut maintenance costs and assure more efficient drainage systems for your overworked roadbeds.

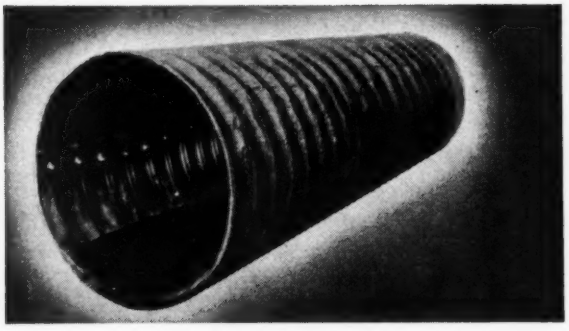
There is a size and type of Armco product for almost every surface and sub-drainage requirement. You can specify them with full confidence they will give you the kind of drainage systems you want.

Back of these special Armco products is a 39-year history of research and field experience. Trained Armco engineers are ready to draw on this specialized knowledge to help you get the job done quickly and effectively.

Remember, if it's a drainage problem, call on Armco. Address Armco Drainage & Metal Products, Inc. and Associated Companies, 3051 Curtis Street, Middletown, Ohio.

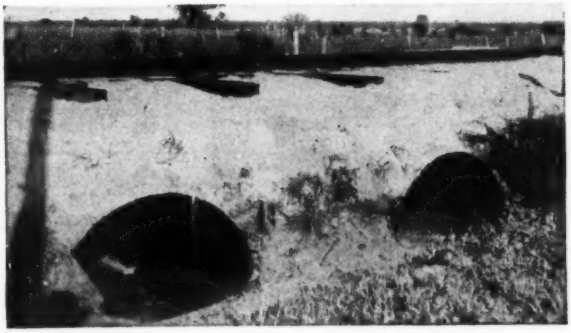


Perforated Pipe. Ideal for all kinds of subdrainage. This sturdy pipe has ample infiltration capacity, will not readily fill up with solids. It is made with circumferential or helical corrugations.



Asbestos-Bonded Pipe. This galvanized corrugated pipe has a smooth pavement of bituminous material over a layer of asbestos felt. Ideal wherever soil or water may cause corrosion or erosion.

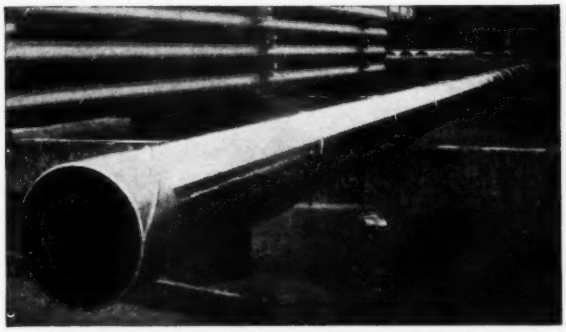
Drainage Gates. Used for flood control, sewer outfalls and reservoir outlets. Adaptable to rectangular or circular openings. Calco Drainage Gates fit all standard diameters from 8" to 84".



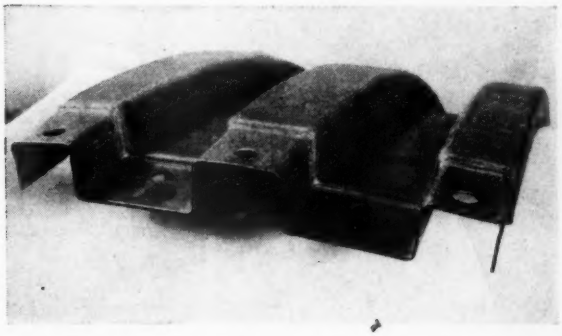
Pipe-Arch. Pipe-Arch has many advantages when used for low-clearance culverts. For many service conditions Pipe-Arch is provided with bituminous paved invert to resist wear in the bottom.

Multi Plate Pipe. Multi Plate extends the advantages of corrugated metal pipe into the 60" to 180" diameters. For large culverts and small bridges, with ample strength for high fills.

Multi Plate Arches. For arches 5' to 25' and larger. Multi Plate provides flexibility, resistance to crushing under live loads, resistance to impact and vibration. Can be installed easily.



Spiral Welded Pipe. An electric fusion-welded spiral steel pipe for transporting water, oil and other materials. Diameters range from 6 to 36 inches, with wall thicknesses from 7/64 to 1/2 inch.



Liner Plate. Used for lining tunnels and shafts. These are corrugated, flanged circular segments that are bolted securely together. Plates of standard liner plate are strong though light in weight.

Steelox Buildings. Engineman's locker room in Ohio freight yard. Steelox prefabricated buildings are made of steel panels with tight interlocking joints. They are durable, attractive, economical.

Retaining Walls. Rugged steel bins encased on all four sides. Earth or other material inside the bins assures sufficient stability. Walls prevent encroachment of streams or embankment slopes.

ARMCO DRAINAGE & METAL PRODUCTS INC.

and Associated Companies

MIDDLETOWN, OHIO

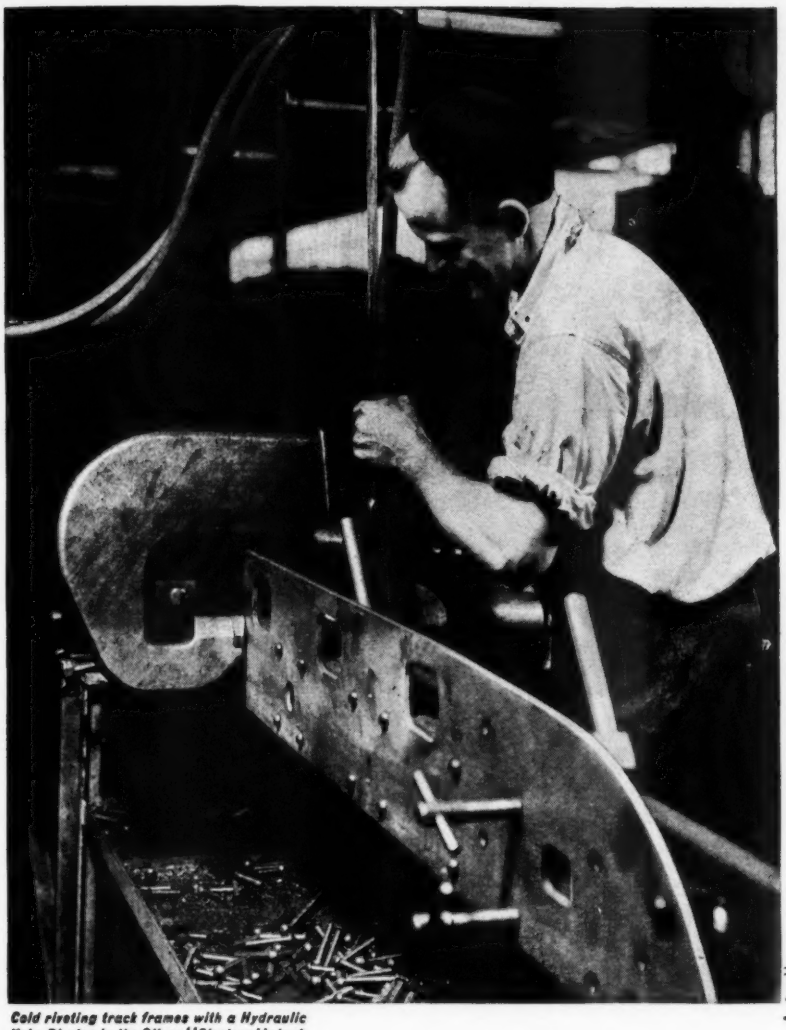
Compression Rail Anchors

THE RAILS COMPANY

General Office

178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.



Cold riveting track frames with a Hydraulic Yoke Riveter in the Oliver "Cletrac" plant.

Added attraction!

To provide greater resistance to shocks, strains and twists of crawler tractor operation, the track frames of Oliver "Cletrac" tractors are reinforced with sections of heavy plate steel . . . an "added attraction" that adds years of dependable service.

Strategically located to provide greatest strength, these steel sections are securely riveted in place by modern hydraulic riveters. This *extra* protection is typical of the many added features that are standard on Oliver "Cletrac" tractors. Through the use of the most modern equipment and production methods, quality is built in... high cost is engineered out.

Maintenance of this standard enables your Oliver "Cletrac" dealer to offer you the finest in crawler tractors . . . for your every need.

CLETRAC

THE OLIVER CORPORATION
Cletrac

a product of **The OLIVER Corporation**

NEW "G-AY" MODEL *DISSTON* CHAIN SAW

WITH MERCURY GASOLINE ENGINE

MODEL G-37 AY DISSTON CHAIN SAW *with Mercury Gasoline Engine*

FIRST IN THE FIELD WITH NEW POSTWAR MODEL . . .

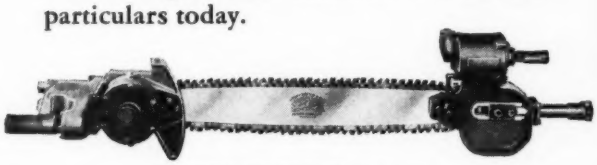
Yet this new model does not represent a sudden change. It is a result of long planning, plus continuous engineering research and development. And to these has been added exhaustive field testing in numerous applications including railroad construction and maintenance work. All combine to produce the most efficient chain saw ever made.

With the green light on for construction of nearly every kind, many of the new improvements you have planned can be started now. There will be much heavy timber to cut. Speed with economy may be essential.

ESTABLISHED 1840

REG. U.S. PAT. OFF.

Both requirements will be met most successfully when you use this new time-and-cost-cutting Disston Chain Saw. Write for particulars today.



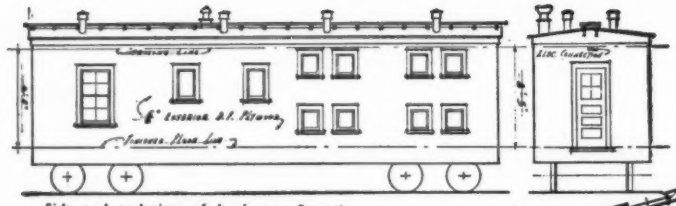
DISSTON CHAIN SAW—*Pneumatic*
3½ h.p., 90 cu. ft. per min. 24" capacity. Wt. 45½ lbs.

OUTSTANDING NEW FEATURES

New "G-AY" Model

- Air Cleaner to keep sawdust and dirt from engine and carburetor.
- Fuel Filter (built in fuel tank).
- Die cast cooling fan.
- Die cast cylinder, with increased number of fins, providing greater cooling area.
- Reduction gear ratio of 3:1—provides more efficient chain operating speed.
- Positive multiple disc clutch, 13 plates.
- Conveniently located throttle may be set in "open" position.
- Muffler prevents exhaust from annoying operator.
- Equipped with "L" pattern chains.
- Equipped with 3-rib protection cradle underneath engine.
- 3-7 H.P. Models; 5-11 H.P. Models—Capacities 24" to 84".

HENRY DISSTON & SONS, INC., 1241 Tacony, Philadelphia 35, Pa., U. S. A.



Side and end-view of bunk car. Smooth, rugged finish made possible by siding with Exterior type Douglas fir plywood (EXT-D.F.P.A.).

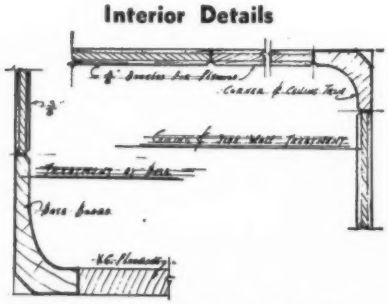
Floor plan of suggested bunk car, showing how well the space is utilized. Interior planned to use 3/8" Douglas fir plywood.

An Eight Man Bunk Car with Foreman Quarters, for New or Rebuilt Construction, using Douglas Fir Plywood

Exterior Type Douglas Fir Plywood

Always look for the EXT-DFPA "grade trade-mark" — branded or stamped on every genuine panel of Exterior-type Douglas Fir Plywood. It is your assurance that you are getting a panel made especially for permanent exterior use.

Interior Details



Detail showing treatment of ceiling, base and side wall construction with Douglas fir plywood.

Roominess, convenience and utilitarian arrangement characterize this plan—a suggested development for either new or rebuilt construction.

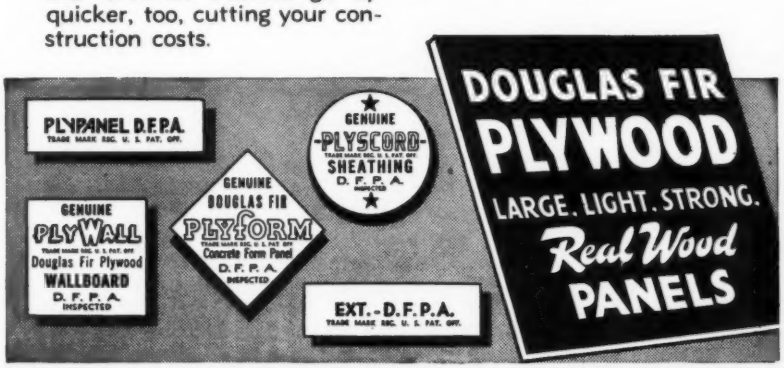
Advantages not immediately apparent are those inherent in the qualities of Douglas fir plywood*—rigidity, tightness and smooth, easy-to-clean surfaces. Cars built with plywood are sturdy because this modern "miracle wood" is cross-laminated for strength. Cars are easy to heat because plywood's large panel size reduces seams and cracks. Panels go up quicker, too, cutting your construction costs.

Douglas Fir Plywood Association engineers will be glad to work with you in developing such a unit; or for technical data and informative literature write

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Washington

*Douglas fir plywood has proved its advantages for railroad construction of all kinds—in box cars, reefers, troop sleepers, and in the building of stations and other structures.

For information on prices and deliveries, see your regular source of supply.



SPECIFY DOUGLAS FIR PLYWOOD BY THESE "GRADE TRADE-MARKS"

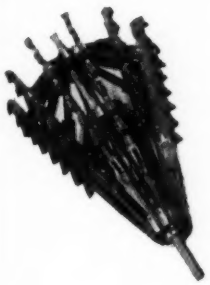
KOPPERS CREOSOTED TIMBER PANEL GRADE CROSSINGS

in darts and in pipe cleaning

AN EXPERT GETS BEST RESULTS

Hitting the bull's-eye consistently takes the ability of an expert. Likewise doing a thorough pipe cleaning job the first time requires the experience and knowledge of a master engineer.

In the matter of pipe cleaning, Pittsburgh Pipe Cleaner Company has the following advantages to offer:



Specialized Tools
Many years of satisfactory job performance
Engineers that are masters in their field

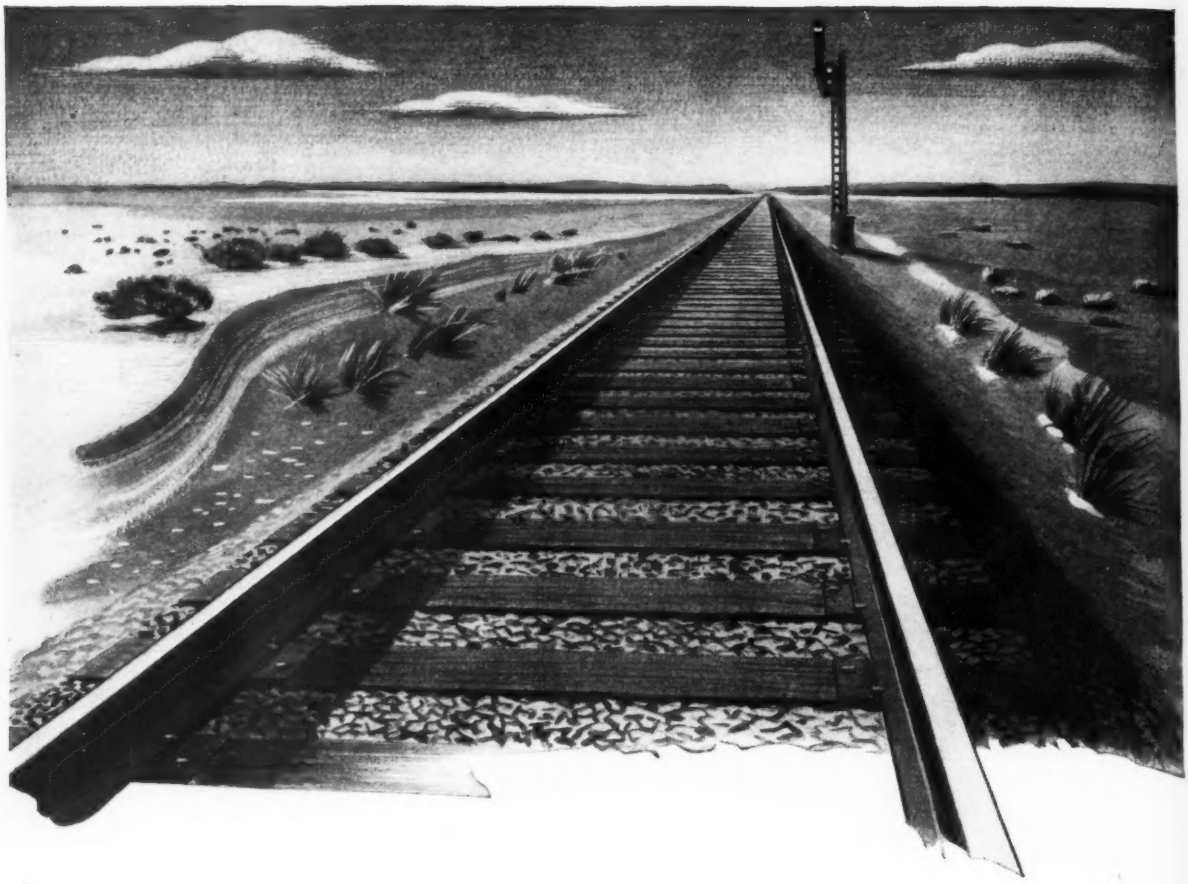
By utilizing our services, you will be able to consistently hit the bull's-eye in your necessary pipe cleaning work because the job will be done faster, better and at a minimum cost.

WRITE NOW FOR INFORMATION ABOUT OUR COMPLETE CONTRACT PIPE CLEANING SERVICE

PITTSBURGH PIPE CLEANER COMPANY

433 MELWOOD STREET PITTSBURGH 13, PENNA

PITTSBURGH, PHILADELPHIA, BALTIMORE, WASHINGTON.
NEW YORK, BUFFALO, CHICAGO, CINCINNATI, ST. LOUIS, DETROIT



SMOOTH AS A RIBBON!

Pounding locomotive drivers and spinning car wheels, working harder and faster today than ever before, are taking a heavy toll on track. Track maintenance is excessive, especially at the joints where ends batter or "cup out"—knocking rail out of line or surface—loosening bolts, bars, or bonds.

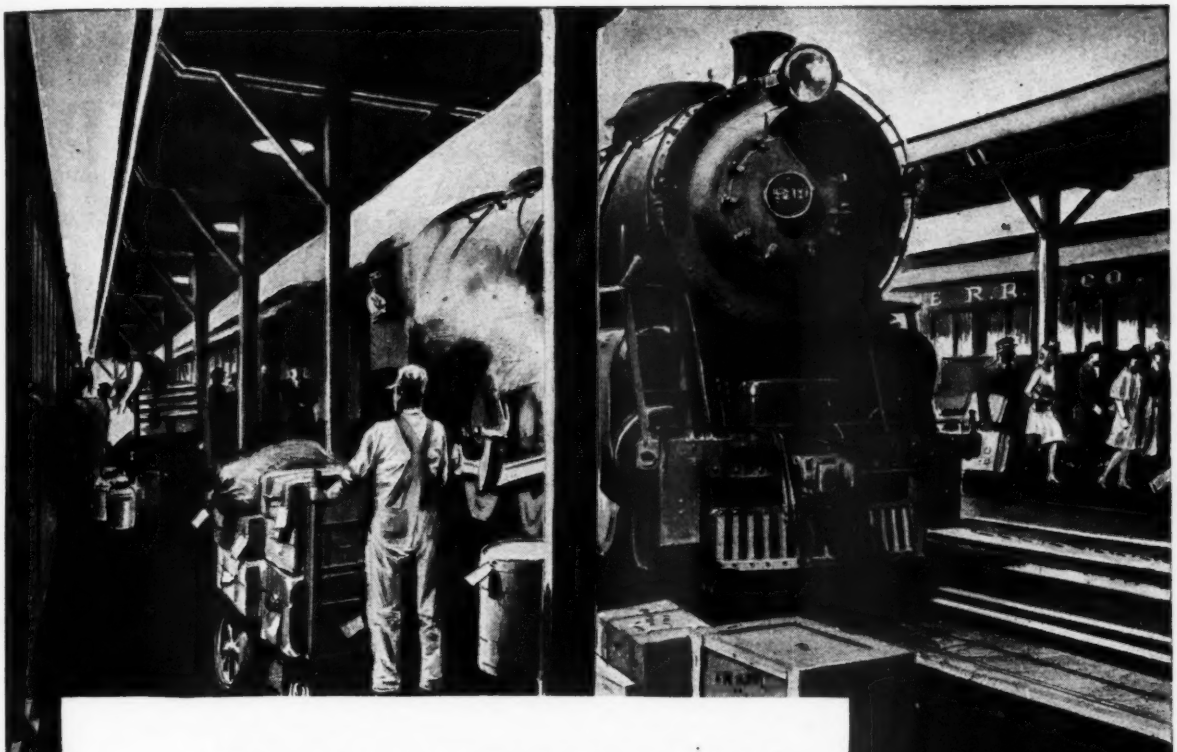
Thermit welding of rail joints is the answer to this problem. Continuous rail eliminates joint maintenance costs, increases rail life, minimizes rail replacement and provides smoother operation at higher speeds. And Thermit welded track is especially valuable for short stretches such as tunnels, grade crossings or paved streets, where corrosive conditions are severe or maintenance presents added difficulties.

The Thermit process yields rail-quality weld metal, forming a strong, dense, permanent joint—free from internal stresses. It requires only simple, portable equipment. And your own crews can do the welding after brief instruction by an M & T representative.

• • •

Write for complete facts to Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y.—Albany, Chicago, Pittsburgh, South San Francisco, Toronto.

Thermit Welding



For REAL ECONOMY

you need a surface that...

LASTS and LASTS and LASTS

... that's why you'll save money (and maintenance trouble, too!) year after year when you specify Flintkote Mastic Flooring for loading platforms, ramps, station floors and wherever a durable, comfortable floor is needed.

Its *tough* surface is hard enough to stand up under the *heaviest* traffic ... yet resilient and shock-absorbing. It won't chip or crack ... even when subjected to heavy impact loads, because it is *malleable* ... a quality that enables it to "heal" its own minor cuts.

It is dustless and noise-deadening; its "cushion" effect reduces wear and gives foot comfort. It resists water and most common chemicals ... protects its base from rotting or corroding.

With Flintkote Flooring Emulsions, Mastic Floors are easily and quickly applied over old floors or on new construction. Any reasonably strong base is satisfactory ... concrete, wood, brick or steel.

Write for complete information on *cold laid* Mastic Floorings.

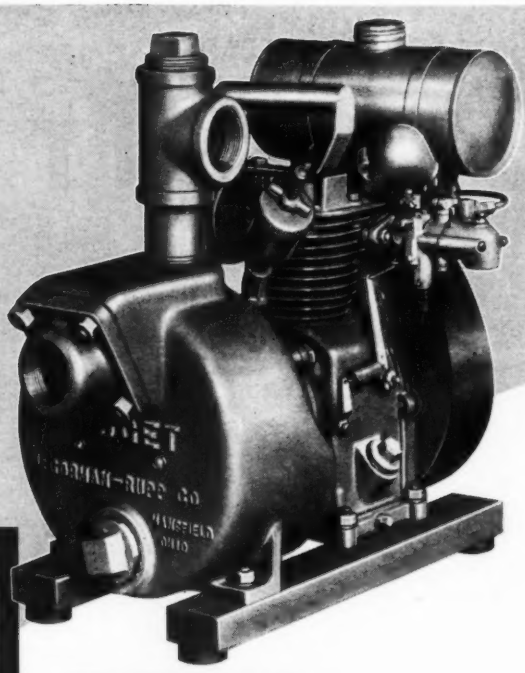
* * *

OTHER FLINTKOTE RAILROAD PRODUCTS: Car Cements – Car Floors – Asphalt Protective Coatings – Insulation Coatings – Building Maintenance Materials – Waterproofing and Dampproofing Materials.

FLINTKOTE INDUSTRIAL PRODUCTS

THE FLINTKOTE COMPANY • *Industrial Products Div.* • 30 Rockefeller Plaza, New York 20, N. Y.

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES • NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL



Pumping Capacities of Four of the More than 50 Models of GORMAN-RUPP Pumps

CAPACITY IN GALS. PER HOUR
with pump 15 ft. above water

TOTAL HEAD	MIDGET (60 lbs.)	EAGLE (120 lbs.)	40-M (1080 lbs.)	90-M (1600 lbs.)
25	3360	11220	——	——
30	3180	10200	34500	76800
40	2880	8400	33900	73800
50	2160	6300	32700	69600
60	1500	2700	30600	63000

3000 gallons AN HOUR

AND YOU CAN CARRY IT IN ONE HAND

Pick it up and run it out to any pumping job in a hurry. Start the motor and you start the water -- its fully automatic self-priming. Muck, sand, weeds, solids won't clog or harm it. At average heads it will handle 3,000 gallons per hour, and it will do it a lot of hours without any attention. That's the Gorman-Rupp Midget -- the toughest little pump you ever saw. Anyone can operate it. There are no valves or priming by-passes or other tricks to learn. It's the simplest pump of its kind. The insides are unobstructed and streamlined for high efficiency and non-clogging operation. Here is streamlining where it counts! All this pumping punch comes in only a 60-pound package, complete. It will deliver over six times its own weight of water per minute. Have one or more Gorman-Rupp Midgets ready for any job that may come along.

GORMAN-RUPP PUMPS — ARMY NAVY — UNSURPASSED FOR PUMP NO. FAST

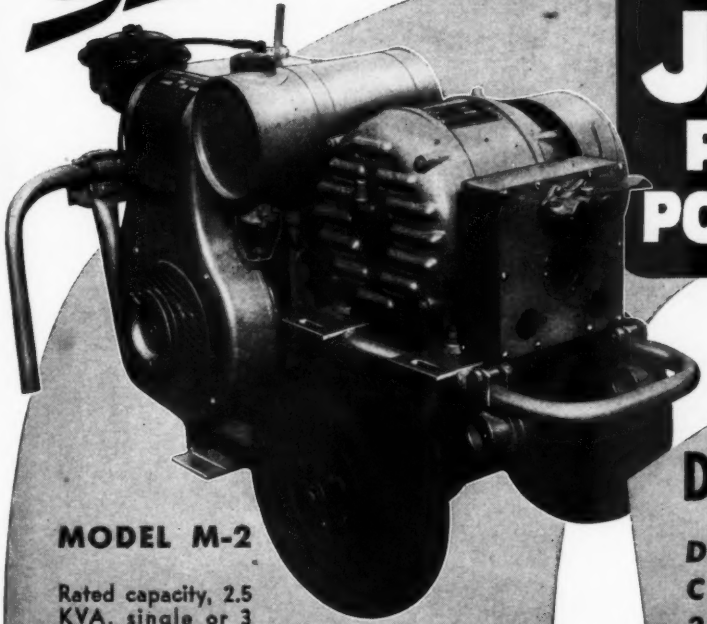
THE GORMAN-RUPP COMPANY

M A N S F I E L D • O H I O

The SENSATIONAL, NEW

JACKSON PORTABLE POWER PLANTS

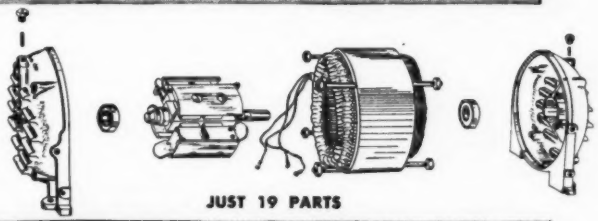
Establish a NEW HIGH *in* DEPENDABILITY



MODEL M-2

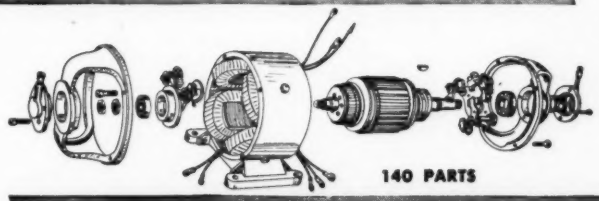
Rated capacity, 2.5 KVA, single or 3 phase 115 volt 60 cycle AC. Other models to deliver 1 KVA and 6 KVA continuous service, or 7.5 KVA intermittent service.

DELIVER FULL RATED CAPACITY IN EITHER 3 OR SINGLE PHASE POWER



JUST 19 PARTS

Detailed above is the Permanent Magnet Generator — used in all new Jackson Power Plants. Maintenance of these generators simmers down to nothing more than lubrication of two ball bearings operated in oil. The following troublesome features inherent in conventional generator design (see below) have been eliminated: Brushes—setting, wearing and adjustment; Brush holders and spring tension adjustment; dressing of commutators and collector rings; Commutator sparking or arcing. Note too, the tremendous reduction in component parts.



140 PARTS

HERE'S post-war planning consummated — the finest, most efficient Portable Power Plants ever known in the railroading field. Power Plants that will give you uninterrupted service 24 hours a day, day in and day out — Power Plants in which all generator troubles and necessity for adjustments and maintenance have been eliminated. They're decidedly superior to their highly rated JACKSON predecessors for operating two, four, eight and twelve tamper outfits, and for B & B gangs there is just nothing to compare with them; for in addition to unprecedented dependability they deliver full rated capacity in single as well as 3 phase power — a generous bonus of "juice" for operating lights, power tools, vibrators, etc. Don't buy any portable power plant before you have had full details on the new JACKSONS. Write today.

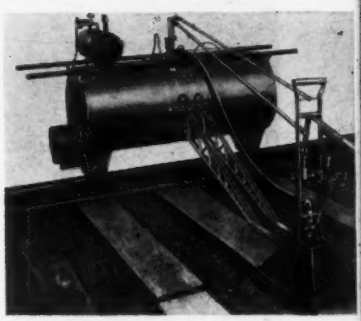
ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan

FIRST CLASS SERVICE

goes with first class track maintenance

Just as the streamlined "City of Miami" is one part of the Illinois Central's progressive program to provide patrons with first class service, so, too, is the use of WOOLERY Tie Cutters, Weed Burners and Creosote Sprayers a part of their progressive program for first class track maintenance.

WOOLERY track maintenance units are designed and built to do a better job faster. That is why today WOOLERY equipment is in use on over 75 railroads.



WOOLERY WEED BURNERS

are available in 5-burner, 3-burner, 2-burner and 1-burner models.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

HOME for them!

and the HOME STRETCH for YOU!

You still have time! In December, your employees' allotments to the Victory Loan through your company's Payroll Savings Plan offer a final chance to help speed the proud homecoming of our fighting men—and do all in medical power for our hospitalized heroes!

Make December a plantwide TOP-THE-QUOTA drive! Now's the time to spotlight your Payroll Savings Plan—and "brief" your Bond-selling organization for fast, last minute action!

Resolicit every employee to buy the New F.D.R. Memorial $200 Bond

The new Franklin Delano Roosevelt $200 Bond—better than actual cash because it earns interest—is a strong building stone toward the secure future of every employee-purchaser!

From now 'til the New Year—with plant rallies, interdepartmental contests and resolicitation—keep Payroll Savings Plan Bond-buying at a new Victory Loan high! Buying a Victory Bond is the best way of saying "Welcome Home" to our returning veterans! Also an active aid in assuring prosperity to your nation, your employees—and your own industry!

VICTORY LOAN

The Treasury Department acknowledges with appreciation the publication of this message by

Railway Engineering and Maintenance

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and War Advertising Council

Modern Airco Processes

Building Up Wheel Burns. Using the oxyacetylene torch and the Airco RR Rod, wheel burns in rails are built up quickly and at low cost. The operation requires but a few minutes.

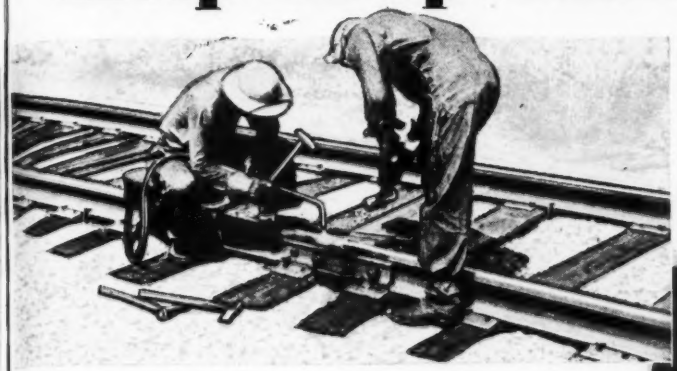
KEEPING America's rail lines functioning smoothly under the multiplied strain of wartime traffic with depleted manpower called for the greatest ingenuity on the part of those charged with maintenance of way.

In the accomplishment of this miracle of transportation, modern Airco oxyacetylene and electric arc processes have played an important part, as they have in supplying the tools of victory to our armed forces. They save time, manpower, and dollars in maintenance of trackage, right-of-way structures, track tools and equipment.

Airco's Applied Engineering Department offers you the benefits of its years of service to America's carriers in the application of these processes to your problems. For complete details, ask any Airco office or write Dept. REM at New York.

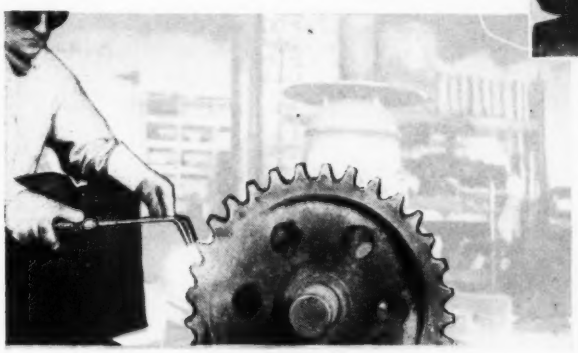
AIRCO

Help Keep 'Em Highballing

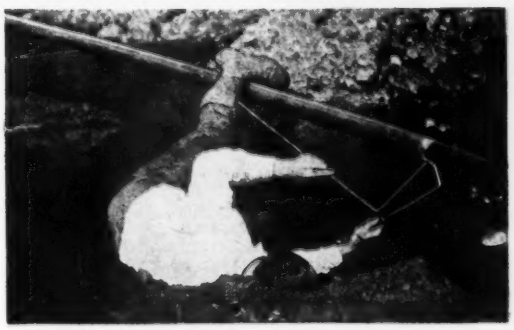


Reforming Rail Ends. Worn and battered rail ends are speedily restored by the oxyacetylene process. The cost of this operation is low.

Gas Welding in Construction. Oxyacetylene welding speeds construction of many types of right-of-way structures such as this signal pole.



Equipment Maintenance. The electric arc and oxyacetylene torch play important roles in the maintenance of track tools and equipment. Here worn teeth on the drive gear of a clam shell are being built up by depositing new metal.



Pipe Welding. Oxyacetylene flame and electric arc welding are widely used to produce strong, leakproof joints in steam, water, compressed air and other piping systems. Joints are made quickly and at low cost.

OTHER AIRCO PROCESSES KEEP 'EM ROLLING

Butt Welding with the oxyacetylene torch eliminates troublesome maintenance on rail joints.

Rivet Washing with the oxyacetylene torch speeds rivet removal without injuring the plate.

Crowning Angle Bars, with the oxyacetylene torch takes out the dip and facilitates the restoration of uniform rail end surfaces.

Flame Cleaning with the oxyacetylene flame quickly and thoroughly removes old paint, rust and scale from steel structures before repainting.

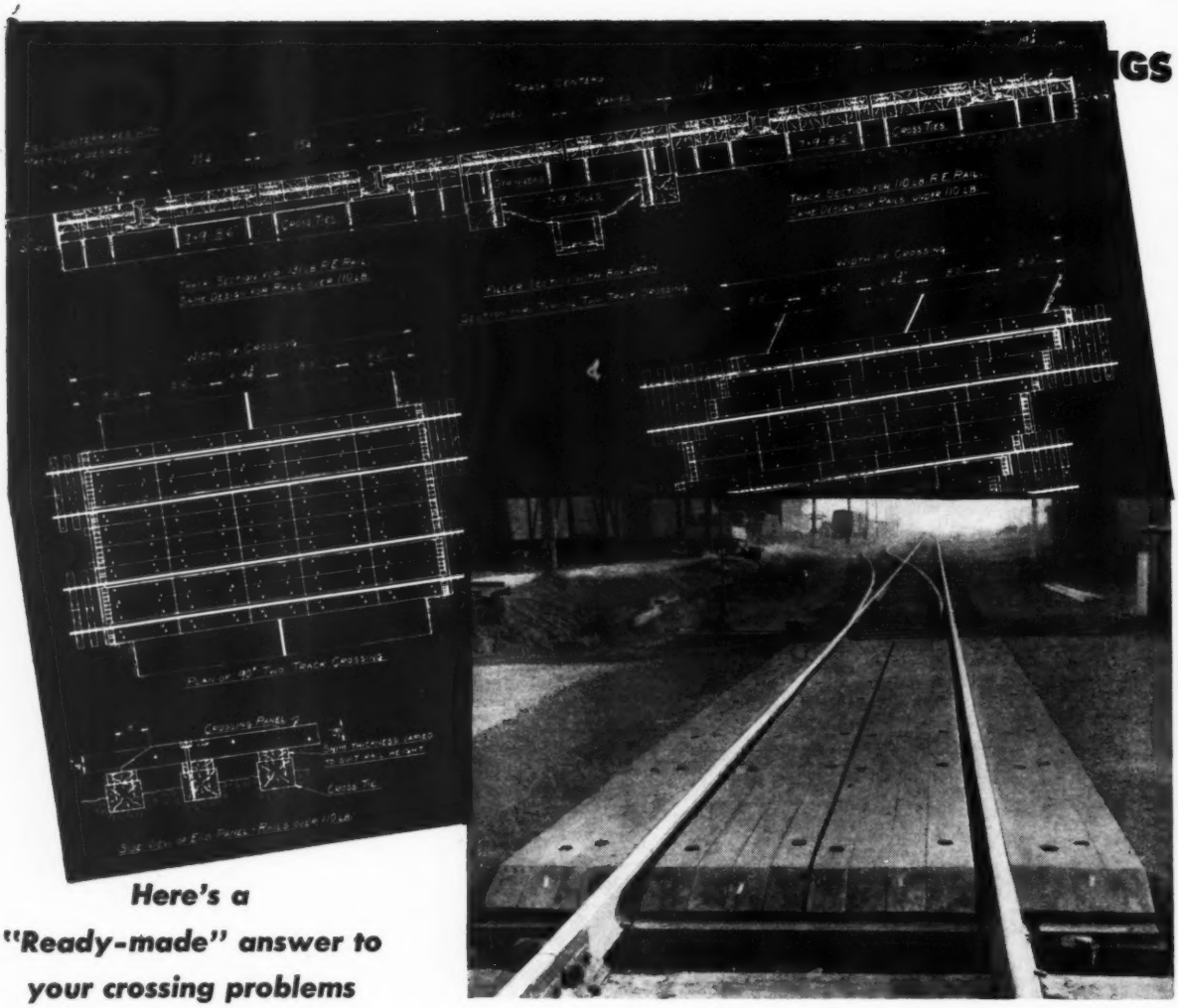
AIR REDUCTION

General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS

Offices in all Principal Cities

Represented Internationally by Airco Export Corporation



Here's a "Ready-made" answer to your crossing problems

When you're thinking of improvement and economy programs, don't overlook the big opportunity presented by highway crossings, the repairs and replacements of which are taking a big bite out of many a maintenance budget.

Koppers Creosoted Timber Panel Grade Crossings are factory assembled as panels and delivered ready for speedy installation. They are strong and durable—maintain traffic surface at installed grade under heavy wheel loads—resist decay—and do not sag, spall, "washboard" or disintegrate. There is 100% reuse of serviceable parts when the track is worked under crossing.

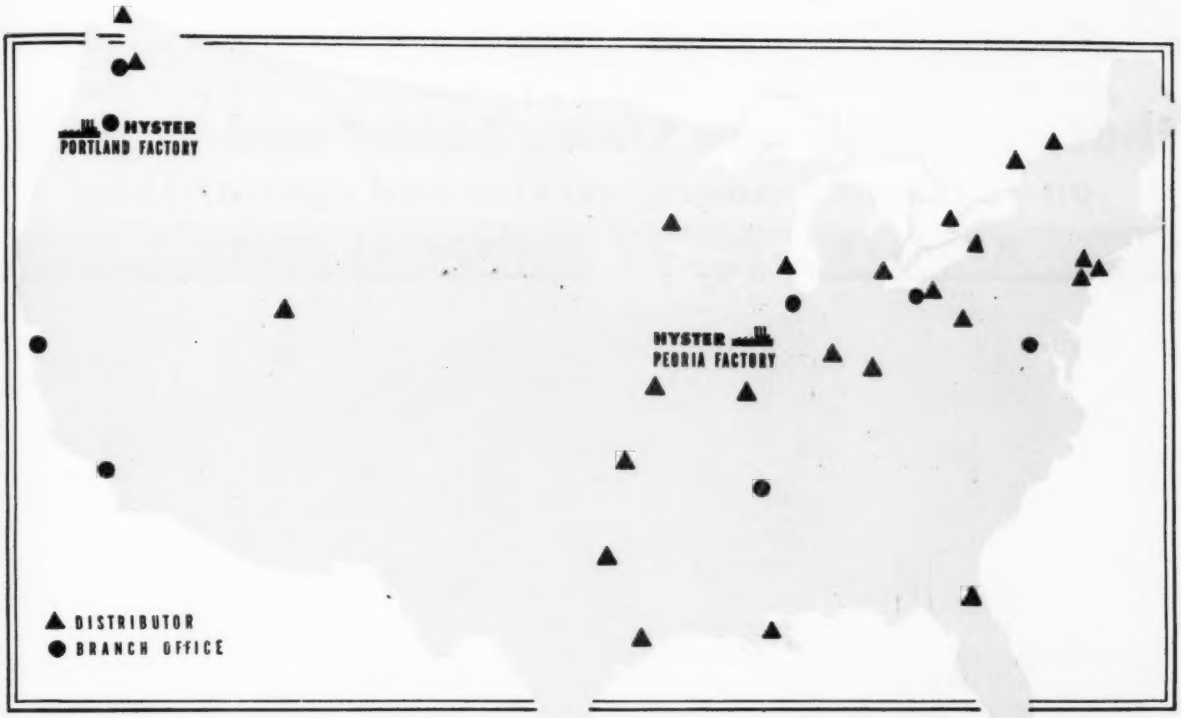
Our Bulletin G-26 gives full details on this money-saving new development. We will be glad to send you a complimentary copy on request.

KOPPERS COMPANY, INC.—WOOD PRESERVING DIVISION

PITTSBURGH 19, PA.

KOPPERS

THE INDUSTRY THAT SERVES ALL INDUSTRY



HYSTER

LIFT TRUCK SERVICE COVERS THE COUNTRY

33 HYSTER DISTRIBUTORS AND FACTORY BRANCH OFFICES GIVE HYSTER OWNERS COAST-TO-COAST SERVICE...

HYSTER owners throughout industry have rapid service on genuine Hyster parts and on mechanical maintenance.

Nation-wide parts and mechanical service is available through 2 Hyster factories, 8 Hyster branch offices and 23 Hyster distributors—a total of 33 centers.

This network of Hyster service facilities provides two important features:

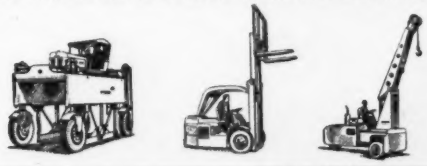
1. **Strategically located supplies of genuine Hyster parts.**
2. **Factory-trained mechanics ready to render special service.**

Hyster lift trucks get around-the-clock use, meet both production and utility demands. When either parts replacements or service attention is required, both are quickly available. *Hyster's Service Department, like Hyster's Sales Department, covers the country.*

HYSTER COMPANY

2994 N. E. Clackamas St., Portland 8, Oregon
1894 North Adams Street, Peoria 1, Illinois

Manufacturers of a complete line of pneumatic tire lift and straddle trucks and mobile cranes



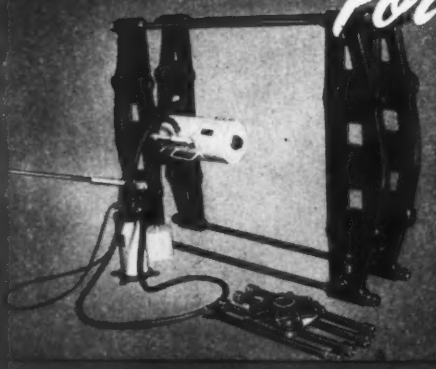
2 unusual hydraulic presses

that can save you Time, Labor and Trouble

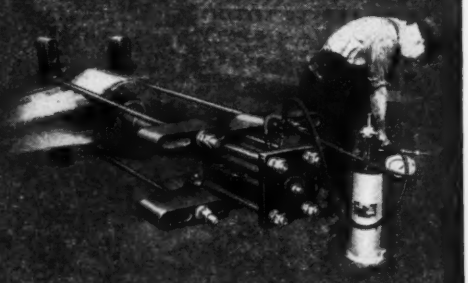
on 101 maintenance, service and special jobs.

RODGERS UNIVERSAL PRESS

Portable

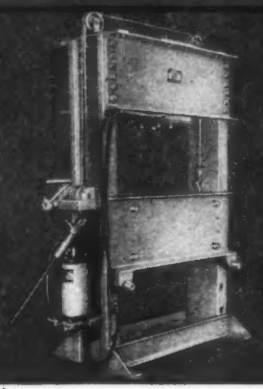


Left: Here is a Rodgers 200 ton Universal with back plate and rods shown beside it. At right is a Rodgers Universal mounted around a large pitman to pull the shaft. Real power—easy to use!

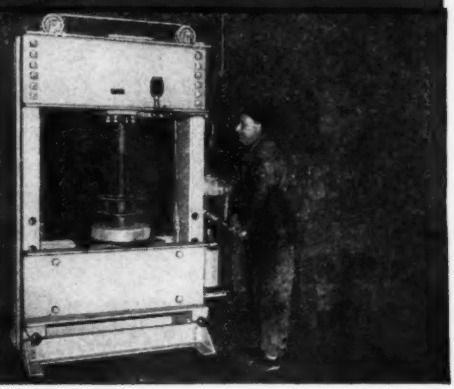


RODGERS SHOP PRESS

Flexible



Left: A Rodgers 100 ton Shop Press—study its simplicity — note pins below bed for increasing opening —hand pump mounted on side. Right: A bushing is easily pressed into a sheave with a few strokes of the hand pump.



STOP and think of all the uses you can find for these versatile Rodgers Presses — pulling gears, pinions and wheels; pressing shafts, bushings and pins, squeezing, clamping and jacking operations —wherever you need 50 to 200 tons of easily-applied hydraulic power.

The Rodgers Universal is a unique portable unit for field or shop service. It is used on a stand as an ordinary press, on its side or flat and is easily assembled around equipment for special operations. Rodgers Hydraulic Hand Pump or Power Pump supplies power.

A Rodgers Shop Press is a flexible unit with a bed that is easily raised or lowered to accommodate various size work. Cylinder may be adjusted across entire width of bed. Rodgers Hand Pump or Power Pump furnishes pressure.

If you have equipment to service you can save yourself hours of time and labor with a Rodgers—they often pay for themselves on a tough job or two. Write for *all* the details. It will be profitable.

Send for this new catalog . . .

It will give you complete information on Rodgers Hydraulic Presses. No obligation, of course. Write today.

Rodgers Hydraulic, Inc.

hydraulic power equipment


Shop Presses

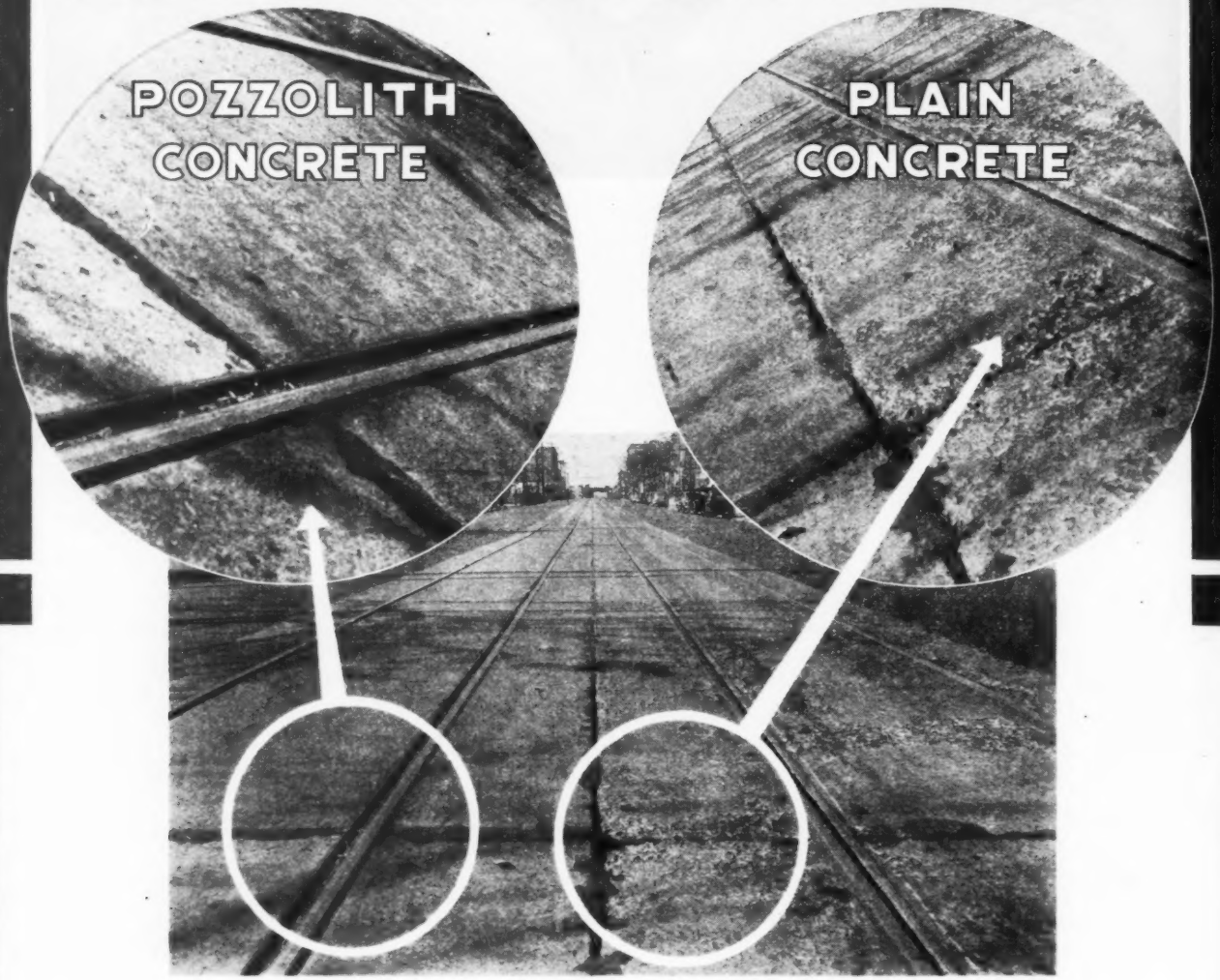

Crawler-Track Presses

7458 Walker St., St. Louis Park; Minneapolis 16, Minn.


Power Pump Units


Portable Presses

HERE'S WHAT WE MEAN BY...
TODAY'S *NEW* CONCRETE STANDARDS



Devil Strips of Pozzolith and Plain Concrete after 5 years service for Bureau of Transportation, City of New York

Through five long, hard winters this street, paved partly with Pozzolith concrete and partly with Plain concrete, underwent freezing and thawing and de-icing chemicals. The picture shows the greatly superior durability of concrete made with Pozzolith *dispersed cement.*

Field performance of Pozzolith concrete proving its great durability in all types of structures, as well as pavement work, has been recently supplemented by an exhaustive investigation made by the Nation's leading testing authority. One series of tests showed that when exposed to freezing and thawing in sea water, Pozzolith concrete proved 400-500% more durable than Plain concrete.

Providing *increased* strengths, in adddition to great durability, Pozzolith marks a new era of concrete performance . . . an era of vastly improved concrete with impressive economies in initial construction and maintenance costs.

Write and we shall be glad to show you the facts.

THE MASTER BUILDERS COMPANY

CLEVELAND 3, OHIO • TORONTO, ONTARIO

MASTER BUILDERS

Christmas Greetings

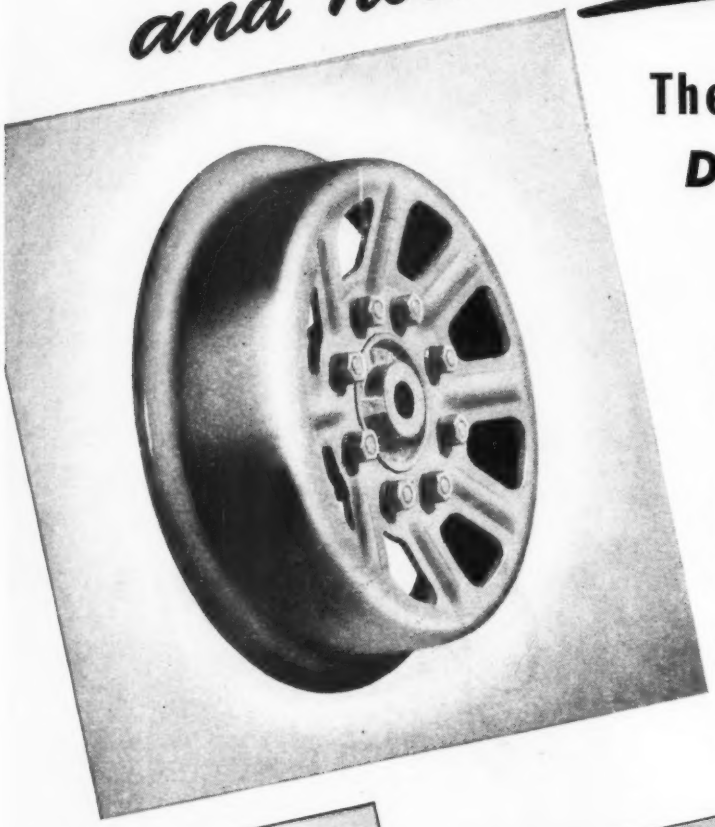
and a Happy New Year.....

to our customers old,
to our customers new,
and to our friends.
May the forthcoming
years of peace be
prosperous ones for you.

WOODINGS-VERONA TOOL WORKS
WOODINGS FORGE and TOOL CO.

VERONA, PENNSYLVANIA

ALWAYS GOOD... *and Now Better Than Ever!*



The FAIRBANKS-MORSE *Demountable-Hub* WHEEL

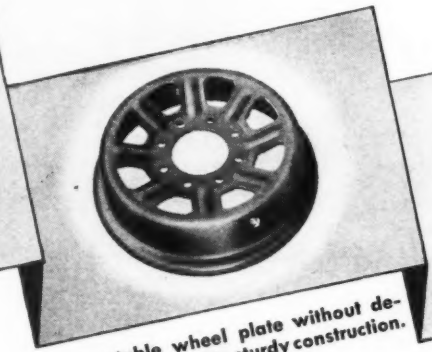
● Extra thickness and extra hardness at the areas of greatest wear—those are the exclusive new advantages of Fairbanks-Morse Sheffield-Steel Wheels for motor, trailer, and push cars.

These life-prolonging qualities result from cold-pressing with newly-designed dies on a 1500-ton press. Fairbanks-Morse controls every processing operation in the manufacture of these wheels. This assures absolute uniformity of the finished product.

The improved wheels conform to all A.R.E.A. standards. Absolutely concentric, they are available in insulated or uninsulated types, in 14-, 16-, and 20-inch sizes.

Write for bulletin. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

Front view of die-forged steel demountable hub.



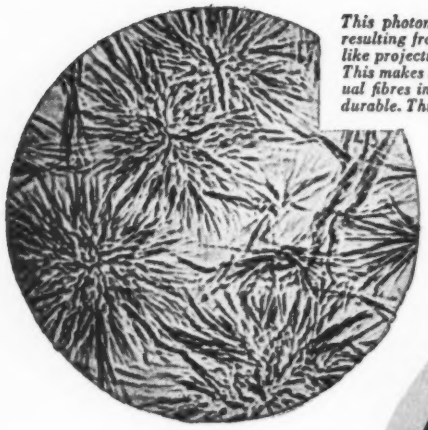
Demountable wheel plate without demountable hub. Note sturdy construction.

Fairbanks-Morse Motor Cars — "first on the rails and still first."

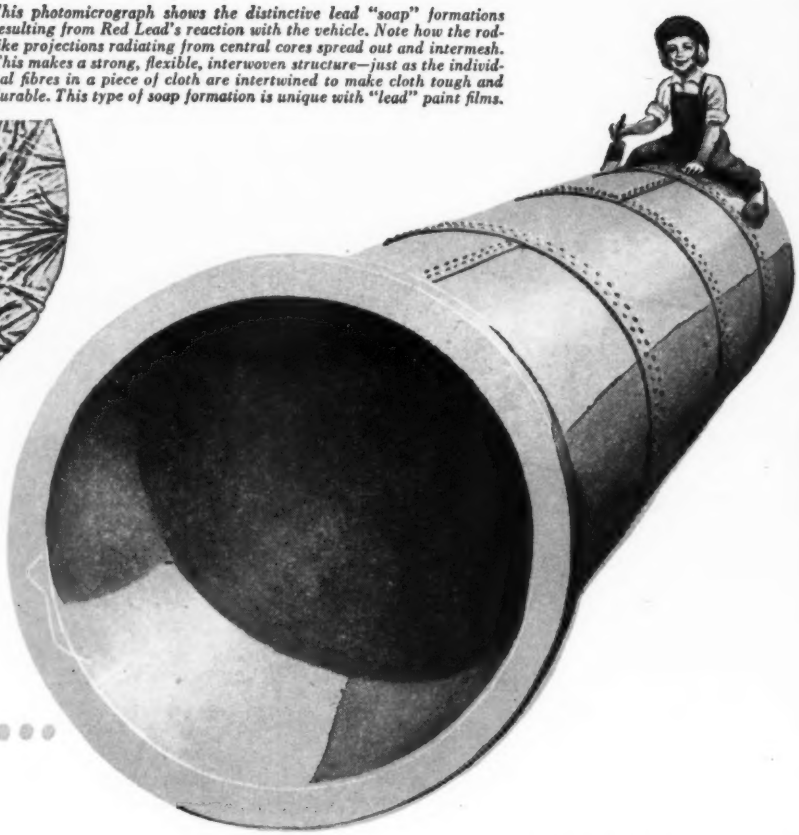
Fairbanks-Morse

A name worth remembering

Diesel Locomotives • Diesel Engines
Scales • Motors • Pumps • Generators
Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment



This photomicrograph shows the distinctive lead "soap" formations resulting from Red Lead's reaction with the vehicle. Note how the rod-like projections radiating from central cores spread out and intermesh. This makes a strong, flexible, interwoven structure—just as the individual fibres in a piece of cloth are intertwined to make cloth tough and durable. This type of soap formation is unique with "lead" paint films.



unique LEAD SOAPS...

another important reason why RED LEAD means Extra Rust Protection

Why is Red Lead outstanding as a metal protector?

One of the major reasons is this pigment's remarkable ability to impart to the paint film strong, tough, intertwining lead "soap" formations—as shown in the photomicrograph above.

These unique lead "soaps" improve the paint film in many ways. For one thing, they form a dense, intermeshing matrix which restricts the passage of water through the film. And rusting does not take place without the presence of moisture.

For another, they *mechanically* reinforce the film, giving it extra *strength* and *toughness.*

And again, Red Lead "soaps" contribute all-important *elasticity* — allowing movement along their intermeshing projections. This action helps prevent the ruptures to which a hard, unyielding film is subject. Moreover, when a paint film dries and ages, decomposition of the vehicle sets in. But, because of Red Lead's ability to combine with the decomposition products and form soaps, it increases both the durability of the paint film and its adhesion to the base metal.

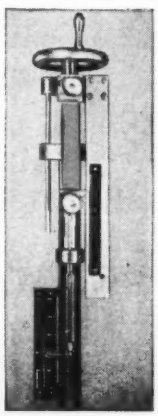
Red Lead's extra strength, toughness and elasticity are demonstrated by the tensile strength test below and substantiated by exhaustive research and field service.

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify RED LEAD for All Metal Protective Paints

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint.

* * *



In this tensile strength tester a typical Red Lead paint film has been stretched 18% without breaking. In withstanding this elongation it has maintained a load of 920 grams. Any film that exhibits these characteristics has unusual strength, toughness and elasticity. As metals expand and contract only a fraction of one percent, this film would adhere under the most extreme conditions.

No matter what price you pay, you'll get a better paint for surface protection of metal, if it contains Red Lead.

Write for New Booklet—"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas—ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

All types of metal protective paints are constantly being tested at National Lead's many proving grounds. The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 80, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna); Philadelphia 7 (John T. Lewis & Bros. Co.); Charleston, W. Va. (Evans Lead Division).

DUTCH BOY RED LEAD

Putting the FINGER *on Potential Rail Failures*

Maximum Rail Safety Is Assured by Sperry Service for Testing Rails in Track

High train speeds and peacetime improvement programs call for maximum track safety by periodically weeding out defective rails. No one will ever know the accidents and delays avoided, the destruction and expense prevented by the removal from track of defective rails found by Sperry Cars. Yet it is certain that by eliminating 50,000 hidden defects annually, the eighty railroads using Sperry Rail Service make important savings.

Track safety demands thorough rail testing which is possible only by the best detector car equipment. Detector cars operated by Sperry Rail Service have reached their superior efficiency through fifteen years of constant research and improvement.

SPERRY

Rail Service

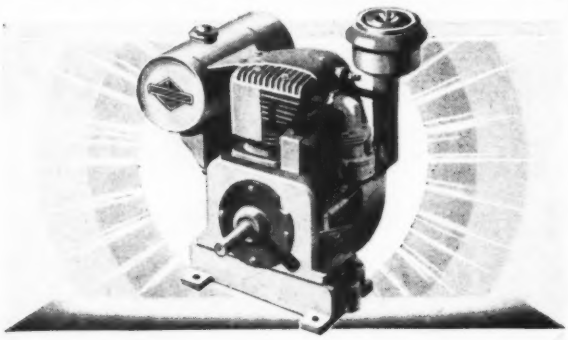
HOBOKEN, NEW JERSEY — CHICAGO, ILLINOIS

POWER WITH

BRIGGS & STRATTON

Air-Cooled Engines

YOUR ASSURANCE OF MAXIMUM PERFORMANCE

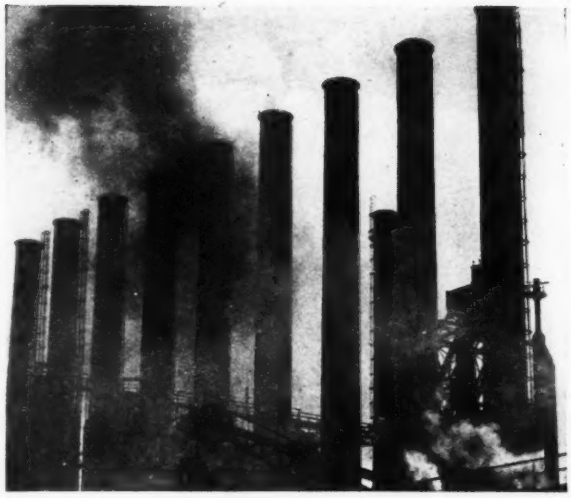


In a brilliant record of dependable, economical operation—well above 2¼ MILLION Briggs & Stratton 4-cycle gasoline engines have *earned undisputed* recognition as "preferred power" the world over. Current models are the result of skill and experience gained during more than 26 years of *continuous production*—and constant advancements in design and precision manufacture. These distinctive Briggs & Stratton advantages are your assurance of *maximum performance*—whether you build, sell, or use gasoline-powered appliances, machinery, or industrial equipment.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wis., U. S. A.

Air-Cooled Power

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES



THERE WILL BE
SMOKE ON THE SKY
IN 1946

—Smoke that means new products for a Nation at Peace —smoke that means fulfilling the needs of some 130 million American citizens. Manufacturers have never before faced such a golden opportunity for tremendous sales volume and a ready cash market. But remember, Water will be one of your most important manufacturing necessities.

Now is the time to plan and put in a modern high efficiency Layne Well Water System—a system that will produce great quantities of water at an extra low cost. No investment you can make will show a greater dividend in savings and satisfaction.

In buying a Layne Well Water System you are obtaining the very finest made. You are assuring yourself of long lasting quality and trouble free operation.

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No. 204 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Our What's the Answer Columns

December 1, 1945

Dear Readers:

The interest of so many of you in the What's the Answer department of Railway Engineering and Maintenance, manifest so clearly in the favorable comments which we receive from you from time to time, prompts me to tell you some things about this section of our publication that may be of interest to you, and, equally on my mind, to thank the many among you who, by your co-operation, have made, and continue to make, this section of such real value. And it is particularly appropriate that I should thus comment at this time, because this issue of Maintenance marks the completion of the twenty-fifth year of our question and answer columns as a distinct department each month.

Yes, it was 25 years ago—January, 1921—that our What's the Answer department was established, and ever since the first year this section has regularly included 8 questions and from 16 to 25 answers. Within this quarter of a century there have been 300 issues of Maintenance, which, together, have included 2,348 questions and nearly 6,000 answers.

Indicative of the broad interest in the questions raised is the fact that over the years answers have been contributed by 2,471 different railway officers, representing about 90 per cent of the Class I roads of the United States, as well as a number of short-line roads and various roads in Canada, and that these have come from 47 of the 48 states. Of interest too, is the fact that during these 25 years, the questions and answers published have had a circulation among more than 8,000 maintenance officers each month, as well as among a large number of others through the additional circulation that has been obtained in the reprinting of hundreds of these questions and answers in booklet form on five occasions.

The foregoing record, whether recognized generally or not, is quite an achievement for any publication. Many other publications marvel at our success in this regard. Many of them have tried to emulate our columns in their respective fields and have failed. Any success that we have attained is due primarily to two things—the close touch which we of our editorial staff try to maintain with you and with your day-to-day problems, and the close co-operation on the part of so many of you with us in the interest of continuing an open forum of the highest standard for the free and frank discussion of your current problems. And to these factors should be added a third and most important one—the interest, untiring efforts and long and varied practical railroad experience of George E. Boyd of our staff, who has borne the main responsibility for the compiling and editing of these columns since our issue of September, 1929.

With the January issue, we start on our next 25 years of questions and answers. As we do so, we solicit anew from each of you questions relative to your current problems and responsibilities. We also solicit answers from more of you—all in the interest of making this feature of our publication of still greater value to you in the days ahead.

Sincerely,

Neal D. Howard

NDH:jb

Editor

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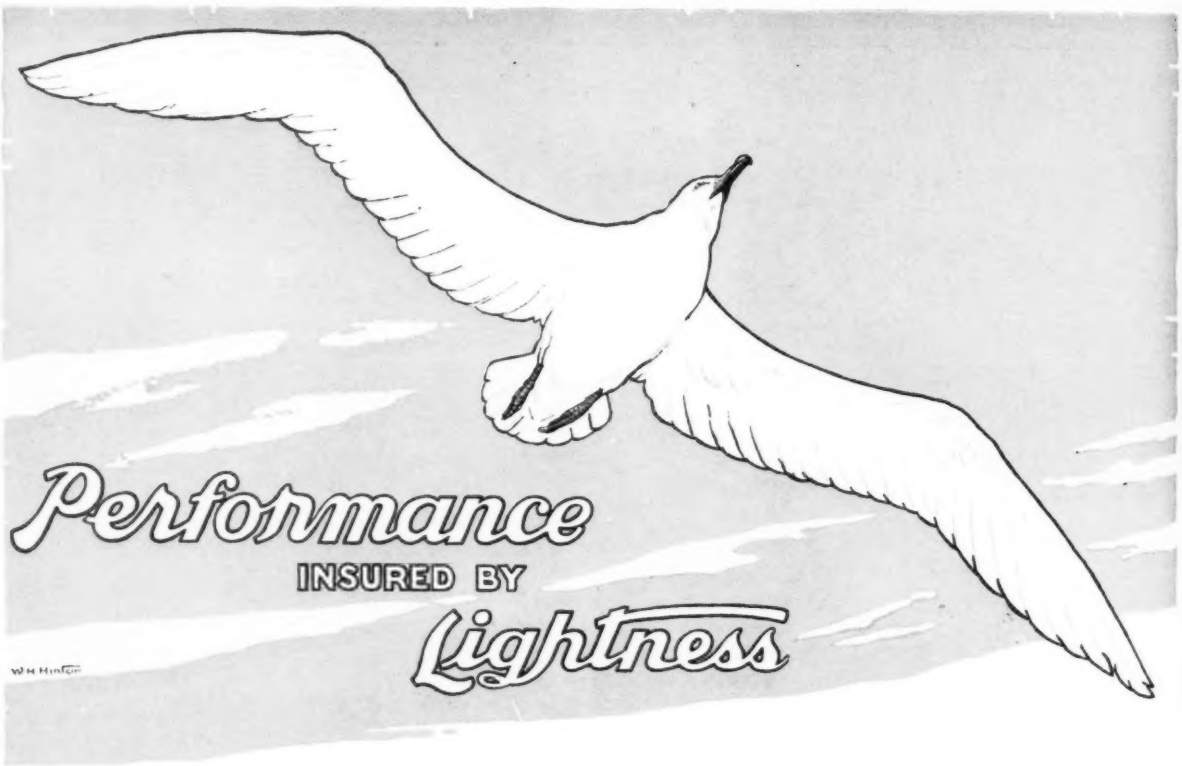

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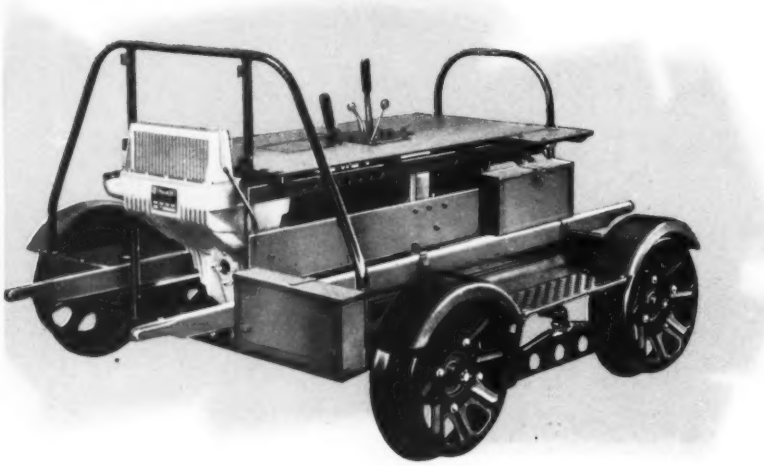

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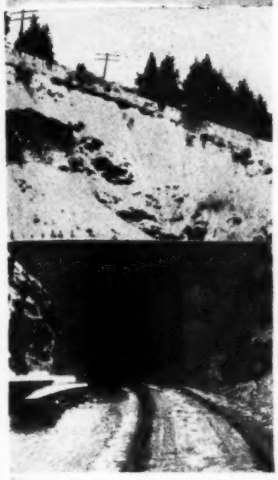

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

DECEMBER, 1945

Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 West Adams St., Chicago 3

NEW YORK 7,
30 Church Street

CLEVELAND 13,
Terminal Tower

WASHINGTON, D.C., 4,
1081 National Press Bldg.

SEATTLE 1,
1033 Henry Bldg.

SAN FRANCISCO 4,
300 Montgomery St.

LOS ANGELES 14,
530 West 6th St.

DALLAS 4
4518 Roland Ave.

Samuel O. Dunn, *Chairman of the Board;* Henry Lee, *President;* Roy V. Wright, *Vice-President* and *Secretary;* Frederick H. Thompson, *Vice-President;* F. C. Koch, *Vice-President;* H. A. Morrison, *Vice-President;* Robert E. Thayer, *Vice-President;* J. G. Lyne, *Vice-President;* H. E. McCandless, *Vice-President;* John T. DeMott, *Treasurer.*

Subscription price in the United States and Possessions and Canada, 1 year $2, 2 years $3; foreign countries, 1 year $3, 2 years $5. Single copies, 35 cents each. Address H. E. McCandless, Circulation Manager, 30 Church Street, New York 7, N.Y.

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4346

Railway Engineering and Maintenance

The Railroads—

Essential in War—Shall They Now Be Crippled?

Supplementing and verifying what became increasingly obvious during the last four years, every report that is being made relative to the part played by transportation in the war—in victory or in defeat—shows that the railroads were the predominant factor. With her rail transportation demoralized by strategic bombing, and primarily for this reason, Germany went down to defeat much earlier than was expected. With our rail transportation systems undamaged and operating at peak efficiency in spite of serious handicaps, the United States today stands victorious, not only over Germany, but in the Pacific as well. This is one of the most important lessons to be learned from World War II. Has that lesson been learned, or will the people of the United States, through ignorance of the facts and unfair treatment, allow, if not cause, the American railways to become weak and unequal to a national emergency in the future?

The importance of transportation, particularly rail transportation, to the economic life of a highly industrialized country is brought out clearly in the recent pamphlet issued by the War Department, entitled, The United States Strategic Bombing Survey—European War. In this, it is shown that, only in the case of industries that could not be quickly decentralized, such as the aviation gasoline industry and the steel industry, was bombing highly effective. For instance, it was pointed out that, in spite of the famous "Schweinfurt" raids on ball bearing plants, bearing production by the fall of 1944 was back to pre-raid levels through dispersion of the industry.

"The attack on transportation, however," it says, "was the decisive blow that completely disorganized the German economy. It reduced war production in all categories and made it difficult to move what was produced to the front. It also limited the tactical mobility of the German army." Need more be said as to the consequences in war of inadequate or inoperative rail transportation?

On the other hand, commenting on the record of the railroads of the United States during the war, a recent issue of the authoritative "Business Bulletin," published by the Cleveland Trust Company, calls attention to the "amazing" degree of dependence of the country's military establishment upon railroad transportation. "In our pre-war planning," it says, "we made the same mistake the Germans made. We assumed that our modern highway systems would play a major role in the movements of men and munitions in the event of war."

Citing the record, the Bulletin then points out that although 31 million troops were moved by rail during the period December 7, 1941, to June 30, 1945, only 731 thousand troops, or less than 2½ per cent as many, were moved by highway. Concerning freight movements, it says that of a total of 307 million tons of army freight moved within this country, some 278 million tons, or more than 90 per cent, were transported by rail, 25 million tons, or about 9 per cent, were moved over the highways, and only 4 million tons were carried on inland waterways.

These are but a few highlights of the record of rail transportation in World War II—a record which should make the American people shudder with the thought that anything, including inequitable regulation of the rates and practices of various forms of transportation, and the lavish subsidizing of competing agencies of transportation—both of which exist today—should be allowed to weaken, if not cripple, the railroads, which have demonstrated so clearly that they are indispensable to the country's war machine.

Fighting Snow—

Work Equipment Becomes a Valuable Aid

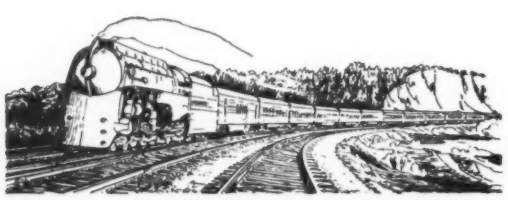
IF present indications, with many parts of the country already covered to some extent with snow, are any criterion, we are in for a long hard winter. Whether or no this promise is fulfilled, it behooves maintenance officers to make their preparations on the supposition that it will be; in other words, to prepare for the worst. It is probable that during the present winter it will be somewhat easier to obtain labor for fighting snow than has been the case for the last three winters, but it will be well not to be too optimistic in this respect, for while there are many idle men throughout the country, many of them will be reluctant or will refuse to accept work of this kind at the wages that are likely to be offered. Too many of them have been receiving inflated wages in war plants and still retain inflated ideas about wages.

Two considerations are involved in making these preparations, the first of which is to assure the effective removal of snow from interlockings, turnouts, slip switches, car retarders and elsewhere where drifting snow is likely to interfere with the movement of trains. This is particularly important in terminals, where there is a marked concentration of these devices for diverting and facilitating the flow of traffic. A blocked switch out on the line may be a serious matter, but it is quite unlikely to delay train and switching movements to anywhere near the same extent as a blocked switch in a busy terminal. Furthermore, this form of trouble out on the line can usually be overcome with correspondingly less difficulty than in the terminal.

The second consideration is to depend less on manual effort and more on mechanization in its various forms, generally with a marked increase in reliability and an equally marked decrease in expenditure. The devices available for keeping switches and car retarders open include switch heaters of the oil-burning type, as well as the fixed electric and gas heaters, and snow-melting equipment of other types, including weed burners, which have been used with outstanding success on several roads. In fact, so sensational have been the results with weed burners that it is somewhat of a puzzle why other roads that are subject to severe snow conditions have not extended the use of this seasonal equipment to include the winter months, when it can be used to such advantage. Tie tamping outfits are particularly adapted for breaking up ice that must be kept cleared away to permit normal switching and delivery operations to be maintained.

In fact, the manner in which the various types of work equipment can be used in fighting snow while the storm is in progress, and later for snow removal, is limited largely by the imagination and ingenuity of the officers that are responsible for keeping the tracks open during severe snow conditions. At one terminal where extended use is now made of the various types of equipment that have been mentioned, as well as of many others that have not, it was not uncommon thirty-five years ago, when the shovel and snow broom were the principal snow-fighting tools available, to employ a thousand extra men both day and night during the progress of severe storms and, sometimes, for several days afterward during the period of snow removal. Today, with more than twice as much trackage and more than a proportionate increase in the number of switches, although with fewer interlockings, the maximum force at this terminal, even under severe conditions, is less than 300 men, with still fewer for less severe storms, and with similar reductions for the cleaning-up periods.

It will pay maintenance officers to give serious consideration to similar use of these and other types of equipment, not only because of the economies involved, but also as an aid in the event that labor is again scarce.



Fixed Camps—

A Substitute for the Condemned Box Car

WHILE it is not to be expected that there will be any immediate overcrowding by war veterans and released war-plant workers to return to or enter railway service, and while the present man-power stringency is likely to continue for several months, the labor situation is quite certain eventually to be considerably easier. For this reason, and because of the large amount of deferred maintenance that has accrued in recent years, maintenance activities are likely to remain at a high level for several years. This means that, beginning as soon as the needed materials can be obtained, and continuing indefinitely, maintenance officers will be confronted with the task of housing permanent and semi-permanent gangs on a scale that will be new to many of them. They should, therefore, begin at once to make their plans for doing this.

Heretofore, when an extra gang was to be organized, or when a section gang was to be enlarged and the labor could not be obtained locally, the approved practice in many cases was to obtain discarded box cars to provide the necessary housing. For large gangs, such as those for laying rail and applying ballast, the cars remained on their wheels so that the whole outfit could be moved as the work progressed. For smaller gangs the cars were usually set off their trucks at some convenient point, windows were cut in them, and they were fitted with stoves and bunks. In a few cases, larger fixed camps were built from condemned box cars at points where large forces were needed permanently, but could not be obtained locally.

In general, the railways cannot be commended for the facilities they have provided for housing their maintenance-of-way labor, especially extra-gang labor. Box cars are hot and stuffy in the summer and are too cold for comfort in the winter. By no stretch of the imagination can they be called attractive, and only men who are inured to low-grade living conditions can be induced to reside in them. On the other hand, almost all labor camps are temporary with respect to any particular locality, so that maintenance officers have not been wholly to blame for

their use of readily available condemned box cars for housing track labor, for when the need for them at any point had passed they could be destroyed without loss, while portable housing such as can now be obtained has not been readily available.

Today, however, there is a different situation, of which relatively few maintenance-of-way officers seem to be fully aware. Owing to developments resulting from military demands for prefabricated buildings and for buildings that could be set up temporarily and moved to new sites when the original need for them had passed, several manufacturers are prepared to furnish standardized prefabricated units that can be used to provide quarters that can be expanded or reduced in size at will, and that can be set up and taken down readily and moved to new sites with minimum disturbance to their occupants.

Several roads used this form of housing during the period when condemned box cars were not available, and found it to have numerous advantages. With it, sanitary conditions were more easily maintained; the buildings set up presented a neater appearance and were cleaner than the typical box car; they provided an opportunity to keep the housing further back from the main tracks; and they were more comfortable than the cars.

Although some of these buildings were used for housing section labor, they were employed primarily for the larger gangs which had to be moved from time to time, and it was found that they had few drawbacks in this service, while they were superior in almost all respects to the typical box-car camp. It might be worth while for maintenance officers to give this matter some thought in connection with housing the forces they will need during the next few years, forces which are likely to be more sensitive to this factor in their employment than has been the case at any time in the past.

Teamwork—

Departmental Co-Operation A Growing Necessity

THERE can be little argument with the statement that the best interests of the railroads are served by a close degree of co-operation between the various departments comprising them. In this respect a railroad may be likened to a group of persons that have been organized to engage in some athletic activity; the primary requisite to success is a sincere desire on the part of all the members to act together as a unit or team, with each of them having an assigned part to play that is co-ordinated with the activities of all the others. If this essential ingredient is lacking in the make-up of one or more members of the group, the possibility is raised of serious repercussions, leading to dissension, jealousy, buck-passing and a breakdown of morale. Obviously, when this occurs the performance of the group will fall far below its potentialities.

In railroading there is a general recognition of the need for departmental co-operation, but frequently other considerations, such as self interest and expediency, are the predominant factors, with the result that the desire for co-operation is forced into a secondary role, thereby becoming ineffective. What can be accomplished when the spirit of co-operation is actively fostered until it becomes a guiding principle is illustrated by the experience of the Chicago, Burlington & Quincy, which is described elsewhere in this issue in a three-part symposium giving the viewpoints of the track, bridge and signal departments. The benefits realized, which are numerous and substantial, are discussed fully by the three participants and need not be repeated here. Suffice it to say that the ultimate effect of the advantages obtained is to promote better, safer and more economical railroad service.

As the railroads face the problems of meeting the competition of the future, the matter of departmental co-operation, especially between the maintenance of way and structures department on the one hand and the operating department on the other, becomes more important than ever before. To obtain and hold both freight and passenger business, the railroads will find it necessary to shorten train schedules by increasing speeds and by maintaining the higher speeds for long distances. In obtaining the latter objective the track and bridge forces can co-operate by planning their work in such a manner as to eliminate speed restrictions wherever possible, and, where slow orders are unavoidable, to make the permissible speeds as high as practicable.

As a preliminary step in this direction, track and bridge men should subject their own thinking in regard to the matter of slow orders to a critical examination for the purpose of determining whether they are being guided altogether by the strict necessities of each case, keeping in mind the interests of the transportation department as well as their own, or whether they are being influenced by other considerations to impose restrictions of unnecessary severity or duration.

On the other hand, with the maintenance forces confronted with the problem of keeping their expenditures to a minimum, the operating departments on many roads can help by adopting a more co-operative attitude in relinquishing tracks to permit maintenance work to be carried out without interference from trains. A great deal of progress has been made in this direction on a number of roads in recent years, resulting in some cases in the adoption of a system whereby out-of-face maintenance work in multiple-track territory is done on "dead" track by establishing "detour" sections that are moved forward as the work progresses, using temporary crossovers where necessary.

Obviously there are many other ways in which a closer degree of co-operation between the maintenance and operating departments will help to further the interests of the railroads as a whole. The important thing for the personnel of these and other departments to keep in mind is that such co-operation is a vital necessity if each railroad is to function with the maximum effectiveness in dealing with the multitude of problems facing it.

C. & I. M. Slows

Surface erosion has been a cause of increasing track maintenance expense from year to year on the Chicago & Illinois Midland, until the railroad began to reap the benefits of an erosion control program started in 1937, employing a number of corrective measures which have either eliminated the erosion entirely or are effectively controlling it. This article describes the measures being employed and tells how they are applied.

Above—A Troublesome Cut Slope That Has Been Stabilized by a Dense Planting of Small Trees. Right—The Same Slope a Few Years Earlier Shortly After the Seedlings Had Been Planted

TO BRING about the effective control of drainage and soil erosion on its property, a problem which had been a source of difficulty for many years, the Chicago & Illinois Midland started a comprehensive program of erosion control in 1937 which involves a combination of corrective measures that are of interest not only because of their scope and character, but also because of the scientific manner in which they have been applied. Basically, the program involves the intelligent planting of trees, shrubs and grasses, and the erection of timber check dams to stabilize the soil in the eroded areas. These measures are used either singly or in combination with each other, depending upon the conditions existing at any particular location. Since the program was put into effect, little or no difficulty has been encountered from surface erosion in the areas where the corrective measures have been applied.

The C. & I. M. operates 131 miles of line, extending in a generally north and south direction, between coal mines in Central Illinois and Peoria, Ill. In traversing this region, it encounters typical mid-western country; the land is relatively flat, broken only by frequent low rolling hills with an occasional steep slope or deep valley. The composition of the soil varies from ordinary black soil to black gumbo, and from sand to clay, while the climate ranges from extremely dry to very wet. Various combinations of these physical characteristics frequently produce surface conditions which are conducive to erosion, with the result that this is more or less commonplace in one form or another unless checked effectively. Under such conditions, it was a constant struggle on the C. & I. M. to keep eroded areas from getting out of control and causing damage to its property.

Erosion Acts Differently

Surface erosion manifested itself in a number of ways along the railroad. Generally, it would gulley the slopes of cuts and fills, sometimes confining itself to small areas, and at other times engulf entire hillsides. At times, following heavy rainstorms, water would undermine the slopes of cuts and fills, causing them to slide into the side ditches and to silt up culverts or other drainage structures. Occasionally, sliding material would wash over onto the track, filling between and over the rails for several inches. At other times the rush of water down side ditches would cut out the ballast and subgrade shoulder, tying up traffic until repairs could be made. On still other occasions, erosion would begin entirely off the railroad property, usually up lateral gullies, and then progress until it eventually involved the right of way and caused considerable damage.

Because of the character of the material composing most of the slopes, it was often necessary to clean long stretches of ballast following overflow of the track. In addition, because of

Run-off to Control Erosion

the prevalence of slides, it was frequently necessary to maintain side ditches of greater than standard width. The erosion of the slopes had the further effect of presenting hazards to traffic. Consequently, it was usually necessary during heavy rainstorms to send a motor car patrol out to inspect the track and see if it was safe. If the track was found fouled or damaged, at any time, slow orders were put in effect until repairs could be made.

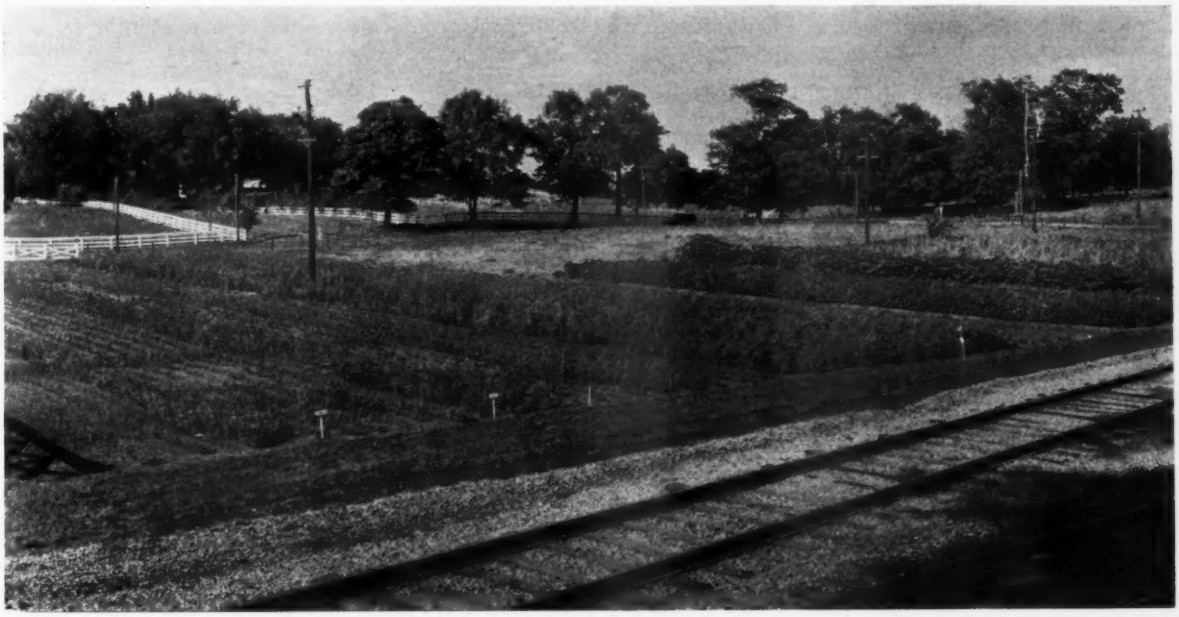
Former Methods Used

Prior to 1937 it had been the practice on the C. & I. M. to employ the then current methods for combating these problems of surface erosion. These methods included the digging of ditches, the straightening of water courses and the grading of the right of way. All of this work was done in an effort to get rid of surface drainage as rapidly as possible, since this was generally believed to be the solution to the problem. So successful was the C. & I. M. in securing rapid run-off that frequently 90 per cent of a rainfall was removed as surface drainage. Progressively, the ditches were made wider, water courses became deeper and the eroding slopes were cut back farther. Furthermore, maintenance costs increased steadily from year to year until, in 1937, it was decided to call in an erosion-control expert to survey all the railroad property for the purpose of recommending the best methods of controlling erosion.

On the basis of the survey made, the basic cause of the soil erosion problems on the road was attributed to the practice of attempting to remove surface water as rapidly as possible. It was pointed out that soil erosion is caused primarily by the washing action of rain on the top soil, which loosens it and subjects it to scour by the run-off action, each time exposing a new surface, which then undergoes the same eroding process. In this way, it was pointed out, erosion is actually a series of cycles which continue as long as the run-off is removed at a speed sufficient to scour the top soil.

The report then showed that if the railroad would change its erosion-control practices from those designed to secure the rapid removal of surface drainage to those calculated to retard its rate of run-off, thus permitting the water to be held temporarily in the soil since natural drainage is through the soil and not over it, the railroad could expect to eliminate most of the difficulties which it was encountering as the result of erosion, with the high track maintenance costs involved.

The Control Measures Employed on the C. & I. M. Have Been Effective in Protecting Slopes From the Type of Damage Shown Here



Part of the Nursery Maintained by the C. & I. M., Near Havana, Ill., to Produce Plantings for Drainage and Erosion-Control Purposes

Check Dams Constructed of Scrap Ties Are Used to Help Retard Run-Off

In 1937 the C. & I. M. adopted the recommendations made, with the result that in recent years the use of ditching machines has been discontinued, and that erosion has been brought under control so effectively that maintenance costs as affected by erosion have decreased each year.

The methods of erosion control put in effect by the road make use of various expedients, either singly or in combination with each other, depending upon the requirements of particular locations. These include the extensive planting of various types of trees and shrubs, both on and off the right of way, where necessary, and the construction of timber check dams in water courses, both parallel with and lateral to the track, to retard the flow of run-off. In addition, resort is often made to the planting of certain types of grasses and to the flattening of the grades of new and existing ditches.

Frequently, adequate plantings of trees or shrubs, or both, have been found sufficient to stabilize the soil; in any event, this has always proved helpful, even though it has been found necessary at times to construct one or more check dams to effect a complete cure. The latter expedient is often necessary where the ground is unusually rough, with lateral gullies which drain into track side ditches or drainage structures. In fact, timber stops or retards have been installed effectively in the gullied faces of cut slopes to retard the flow of water and thus minimize its eroding effect.

Experience on the C. & I. M. has shown that, to be effective, the erosion-control program adopted must comprehend the ultimate goal, the physical limitations involved in any situation, and the overall economies. It has shown further that each eroded area is a problem in itself, requiring that an analysis be made and that the proper measures of control be applied in accordance with the particular conditions found.

Check Dams

In gullies, and sometimes in streams and drainage ditches, the dams installed range in number and size depending upon the conditions encountered. These are usually constructed of scrap crossties and switch ties and consist essentially of a vertical face with an apron in front, the object of the apron being to break the fall of the water over the dam and prevent its undermining the face.

In the face, the ties are placed horizontally on top of each other and are held in position by additional ties driven vertically into the ground on each side. The bottom ties in the face are set in a shallow trench dug in the ground, and the cracks between ties as laid up are filled with a mud mortar to minimize leakage until silting has taken place. In addition, to retard the flow of water as it approaches the dam, and thus cause it to deposit its silt, and to minimize hydrostatic pressure against the dam until silting has taken place, an earth backfill is usually thrown up behind it, the material used being excavated from the stream bed.

To concentrate the flow of water passing over the dam, and thus cause silting as rapidly as possible, a weir effect is provided in the center top of the vertical face of all except the shallowest dams by making a rectangular-shaped notch in it about 4 ft. wide and up to as much as 2 ft. deep, depending upon the height of the dam. The apron of the dam is made by laying ties horizontally on the ground perpendicular to its face.

All of the dams constructed are temporary expedients since they are silted in rapidly, often completely to the top in as little as three years—the ultimate effect being to flatten the gradient of the stream bed between dams, and thus permanently retard the flow of water. However, all of the dams are constructed strong enough to hold the water back until the silting process has been completed.

When conditions require more than one check dam in a gully or water course, the first dam is usually located near the up-stream end and is made about 2 ft. high. The next dam is located so that its notch is approximately level with the lower end of the apron in the first dam, and each succeeding dam is then located similarly with respect to the preceding dam.

An advantage of this method of locating the dams is that neither instruments nor a surveyor are required in the work.

Immediately following the construction of the check dams, trees or shrubs are planted in the gullies and around the dams to further retard flow, speed up the silting process, and help bind the soil together. These plantings become effective in retarding erosion as soon as they come into leaf, and, where adjacent to the dams, their roots grow between and around the timbers and thus aid in holding them together.

Planting Most Important Phase

In most instances, the planting of erosion timber and shrubs has proved the most important single phase of the erosion-control work. In this, the selection of the proper seedlings to be used, the manner in which they are to be planted, and the care which they are to receive subsequently, are all dependent upon the conditions existing at any specific location. In controlling erosion by forestation, the root systems developed by the plantings are the most important factor in their effectiveness. Therefore, careful consideration must be given to the ability of the plantings to survive and grow under the soil conditions prevailing at any particular point. Other factors to which consideration must be given include the height of the plants at full growth, and their ability to survive cutting back.

With due regard to the foregoing considerations, a number of different types of plantings are used in the work on the C. & I. M., the most common being black locust, chiefly because it has the most extensive root system of any type of tree used in erosion-control work—the roots often growing 10 to 15 ft. long. Furthermore, black locust can survive in soil of the poorest quality, including clay, black gumbo and blow sand. In fact, it grows best if the soil is not too rich or too wet. Because of these general qualifications, black locust is used in many locations on the slopes of cuts and fills, as well as in ravines and gullies.

Another characteristic of black locust that makes it especially useful in erosion-control work, especially in water courses, is that it will grow from its trunk as well as from its basic root system, so that it can be silted in as deep as 8 to 10 ft. and still grow. Furthermore, it can be cut close to the ground and will continue to live. It is the usual practice on the C. & I. M. to top black locust growing on steep slopes of cuts and fills about every three years to lighten the load on the soil. This work is generally done in the fall, and by the following year the trees have stooled out from the ground enough to furnish adequate protection to the soil from direct rainfall.

Many other types of plantings are used singly or in combinations for erosion control on the C. & I. M., the seeds for some of which are imported from the western desert regions of the country. These include Chinese elm, Russian olive, ash (all kinds), wild plum, western sand cherry, buck brush, willow, snow berry, and a variety of grasses. The desert plantings, including the western sand cherry and the snow berry, are used primarily where the soil is chiefly sand and where they are exposed to the direct heat of the sun. In regions where weed growth is prevalent and objectionable, broad-leaf trees are frequently used, their dense shade tending to discourage weed growth. In several locations on the railroad, local conditions, considerable importance is placed on the manner in which they are planted. In the latter regard, the road uses plants which are not more than one year old so they can be handled readily, and it usually plants them in an irregular arrangement, but with a pre-determined spacing, depending upon the types of plants and the condition at each location—rather than to place them in a row system. Although planted in a seemingly casual arrangement, the spacing employed between plants is of the utmost importance, and should be determined only by a person who is experienced in this work.

The plantings are made on slopes of any degree, as required by conditions. On slopes up to 1 :1, it has been found best to plant the seedlings in a vertical position, while on steeper slopes, even the vertical banks of scouring streams, it has been found best to plant them perpendicular to the slopes.

A Portion of One of the First Projects at the End of Seven Years. Shortly Before the Picture Was Taken the Trees Were Topped to Relieve the Load on the Soil

this practice has either greatly decreased or entirely eliminated the need for weed mowing.

Among the grasses used, the predominant types are June grass and red top grass, both of which have proved effective on the slopes of cuts and fills, especially the slopes of fills composed of mine slag. Experience has shown, however, that seeding slopes with grasses alone will seldom control erosion completely. Therefore, on more occasions than not, the grasses are sown in conjunction with locust, buck brush or other shrubs or trees.

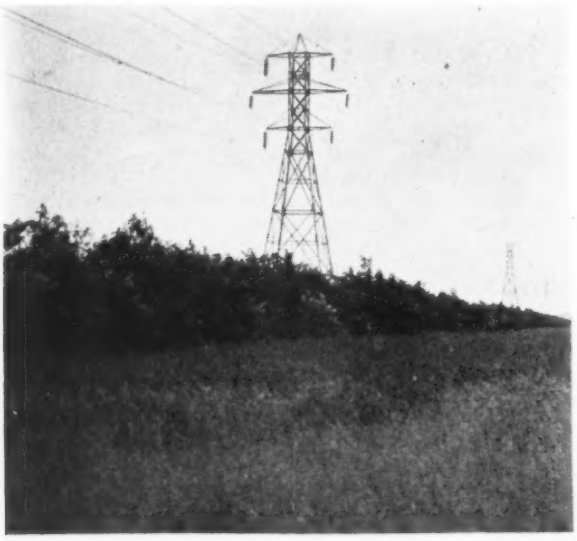
In addition to the care with which trees and shrubs are selected to meet

To carry out its erosion-control operations, the C. & I. M. established and maintains a nursery for producing the plants required. The nursery is located at Havana, Ill., and is part of the road's agricultural farm, operated for the benefit of the surrounding farm communities. All of the plants produced at the nursery are grown from seed.

There are two seasons during the year when the seedlings are transplanted—namely, spring and fall. When transplanted, the plants are about two feet tall, and the tall varieties continue to grow an average of about two feet each year, gaining their full root systems in about three years' time.

By using plantings of not more than one year's growth, production is increased and transplanting costs are held to a minimum.

The nursery personnel employed in producing the seedlings consists of three men selected from the road's agricultural and maintenance of way employees, who were subsequently trained to be nurserymen by the erosion specialist employed by the railroad. These men are employed continuously in the nursery work. The planting of the seedlings and the construction of the check dams are done by a contractor, with a trained crew, which works under the direct supervision of the road's specialist. Usually, each member of the contractor's crew can plant about 400 seedlings a day.



This Permanent Snow Fence Is Two and One-Quarter Miles Long

Careful Survey Made

As the first step when erosion-control measures are contemplated at a given location, a survey is made of the eroding section and of the surrounding area by the erosion-control specialist, to determine the cause of the erosion and to decide upon the best method of effectively controlling it. Frequently it has been found that the erosion problem begins as much as a quarter to a half mile away from the right of way, on adjacent private property. Where this has been the case, it has been necessary to secure the permission and co-operation of the landowner to install the proper erosion-control measures on his property. Without exception, this co-operation has been secured after the railroad has explained to the property owner that he would not have to make any financial outlay, and that all of the trees or shrubs planted on his property would eventually belong to him.

The fact is also pointed out that the contemplated drainage and erosion-control measures will actually benefit his property as well as that of the railroad, because frequently, through the efforts on the part of the railroad to stabilize eroded areas adjacent to or back from the right of way, these areas have been restored to useful farming. At the same time, where trees are planted, the farmer gets a stand of trees suitable for making fence posts or for other farm needs.

Typical of a number of right-of-way drainage and erosion-control problems overcome on the C. & I. M., involving cuts, is that which was encountered at Tice Hall, in a long cut, about 70 miles south of Peoria, where the main line descends in a northerly direction on a 1.0 per cent grade for about 1½ miles. Here, where the soil of the various cuts consists of sandy clay, the west side of the cut is rather steep, while the other side slopes back gradually for one half mile before reaching level ground. The slope on the west side of this cut had eroded badly over the years, and it was a common occurrence with each heavy rain for the soil to wash down the slope faces, fouling or completely filling culverts and ditches, and frequently flowing over onto the track. At times, the rush of water down the side ditches would tear out the ballast and subgrade shoulder, tying up traffic until repairs could be made.

To correct this condition, the road constructed 35 check dams over an area of about 25 acres back from the right of way. In addition, it planted about 20,000 black locust trees. This work was completed in 1938, and so corrected conditions as to provide complete stabilization of the roadbed. Since then there have been no train delays or maintenance expense at this point because of surface erosion.

The total cost of the corrective measures taken at Tice Hill was approximately $1,400, this including $528 for the 35 dams installed, which included a charge of 10 to 15 cents for the handling of each of the scrap ties used; and a charge of $860 for the 20,000 black locust seedlings, which was made up of the cost of the seedlings at $3 per thousand, and $40 per thousand for planting.

Because of the general success of the program being carried out on the C. & I. M., it is no longer necessary to continue some of the costly measures which were formerly required as the result of erosion, such as almost constant ditch cleaning, the excavation of ditches to greater than standard width to take care of excessive flow, the providing of motor-car patrols during heavy rain storms, and the continual grading of slopes to secure faster run-off.

Another feature of the erosion-control program is the matter of snow protection, a feature which has been incorporated in the program with considerable success. This involves the replacing of slat snow fences with permanent snow fences consisting of trees and shrubs planted in a predetermined arrangement. With this type of fencing, which is used chiefly at locations where high drifts have caused trouble to train operations, it has been found that a three-row barrier, if properly planted, is much more effective and less costly over a period of time than any fence constructed of wood or other material. The trees generally used for these barriers are black locust, elm, oak, plum and Russian olive.

Decreasing Costs

The cost of the drainage and erosion-control program of the C. & I. M., has varied from year to year with the amount of work undertaken in different years, and it is expected that it will decrease steadily in the future as additional points of difficulty are taken care of. Even to the present time, however, it has been found that the savings that have resulted in routine track and right-of-way maintenance costs as a direct result of the erosion-control work have more than offset the expenditures entailed.

All of the drainage and erosion-control work on the C. & I. M. is under the general direction of C. H. Paris, chief engineer, and under the direct supervision of R. J. Dills, erosion-control specialist for the road.

Track Labor Outlook Not Good in the East

THE outlook for track labor in the Eastern part of the country, contrary to expectations after V-J Day, is getting worse, instead of better. This was revealed at a recent meeting of the Metropolitan Maintenance of Way Club at New York, when the question, "will the local supply of track labor improve in the next seven months?", aroused an animated discussion, in which two engineers maintenance of way and several division engineers and supervisors of track participated. Their analysis of the situation included both the New York terminal area and rural areas on line, extending several hundred miles from New York. In all cases the picture presented was gloomy.

In general, all those taking part in the discussion stated that war-plant lay-offs had not helped the railroads secure track labor because the men being laid off were not willing to work for less than their war-time wages. As an example of this attitude, one area was cited, embracing three medium-size cities, where 6,000 persons had been laid off by war industries. Despite this large number of unemployed, a nearby plant, which had been seeking for some time 300 men at 90 cents an hour, was able to get only a few additional workers, while the railroads in the area, seeking men at 65 cents an hour, were not able to secure a single man.

One division engineer reported that repeated inquiries of the United States Employment Service finally elicited the response that requests for track laborers at 65 cents an hour will not secure any additional workers for many months—probably not until June or July of next year, and that then the supply will be very limited. Another division engineer reported that on one subdivision only one new man had been hired since V-J Day, despite strenuous efforts to secure additional workers.

The rural labor situation was reported, however, as not nearly as bad as that in the New York Metropolitan area, where the railroads compete in the labor market with industries offering jobs at $1.20 to $1.40 an hour, and where even stevedores on the waterfront earn $1.35 an hour. In this area the railroads have been dependent upon Mexican Nationals and "Bowery bums" as sources of extra labor. Now that the Mexicans are being sent back to Mexico under War Manpower Commission orders, the only source of labor left will be the Bowery.

The Bowery laborers, they said, are not very satisfactory. They will work *after a fashion,* but only for short periods of time, and not in rural areas unless their camps are located near a city or town where they can go on a "binge" when they feel so inclined. Furthermore, in terminal territories, they quit if they are not paid daily. These men, it was said, average about 16 days' work each month and the turnover is high. In addition, they were reported as only about one-sixth as efficient as the best section labor available a few years before the war.

Several of those discussing the labor situation compared it with the similar situation which existed for three or four years after the last war. The only bright spot in the labor picture, according to those at the meeting, is the few discharged service men who have returned to the railroads. They are reported as satisfactory.

A number voiced the fear that severe winter conditions in the northeastern part of the country, similar to those experienced last January and February, might completely tie up the railroads, especially since most, if not all, of the Mexican track laborers will have been shipped back to Mexico by that time, and because there will be no possibility of recruiting emergency help from soldiers and sailors as was done last year. All those present agreed that the railroads should pray fervently for a mild winter.

The Return of All Mexican Nationals to Their Homeland Will Leave a Large Gap in the Track Forces

This symposium on co-operation between departments was presented at a meeting of the Maintenance of Way Club of Chicago, by three officers representing these three departments on the Chicago, Burlington & Quincy. The speakers, who were selected from the same road deliberately to insure that the subject would be treated from the same viewpoint, show that co-operation is not only possible, but is highly beneficial to the road and to the men.

Does Co-operation Yes! Say Track,

Have Always Stressed Co-operation

By E. J. Brown
Engineer of Track,
C. B. & Q., Chicago

ONE of the essentials of good organization is teamwork, not only between departments but also among the individuals who comprise those departments. In the railway industry, we have always stressed, through the medium of rules, the importance of co-ordinating the operations of the various departments so that the work to be performed will progress as efficiently and as safely as possible. Regardless of these rules, however, there are always differences of opinions, because the railway spreads over many miles and into many states, and includes in its various departments, men of every walk of life. For the most part, therefore, supervisors and others in the field must decide how the work will be handled.

Many Joint Responsibilities

The three departments represented in this symposium have more in common than any others in the railway industry. Track men have to work out their problems with bridge men when working around bridges and culverts. Likewise, when working, where interlocking, CTC and automatic block signals are in service, the signal department must be consulted. Occasionally, the men from these three departments do not agree on the method by which certain work should be done, but sometimes this disagreement is an advantage rather than a disadvantage, because frequently out of these differences new and better methods are developed.

The track and bridge men are vitally concerned in matters relating to bridges and culverts. The unloading of repair materials for both is planned by roadmasters and master carpenters. Each can help the other to get these materials unloaded at the right place where the least handling will be required. Otherwise, it might be necessary to move gangs for long distances.

Another item in which both departments are vitally interested, which has increased in importance during the last two years, is in arranging for the unloading and placing of riprap. Locations and the amount of rock necessary are agreed upon by master carpenter and roadmaster, and the material is unloaded by the track forces and, generally, is placed by them. Where it is necessary to grout rock so placed, the work is performed by the bridge department.

Joint inspections of culverts are made by men from these departments and details of these inspections are presented in joint reports to the superintendent and district engineer of maintenance. The co-ordinated effort of bridge and section men in putting back together pipes which have pulled apart is arranged for, and the cleaning out of these pipes by the track men is done to take care of drainage.

The best demonstration of co-operation between the two departments occurs during washouts. Many such emergencies have proved conclusively that co-operation is necessary to get the line re-opened quickly. The bridge men crib up the track over holes and make it ready for the track men to unload material from work trains. Such co-operation yields quick results and eliminates disagreements which would be certain to retard the completion of the job.

Track and Signal Forces

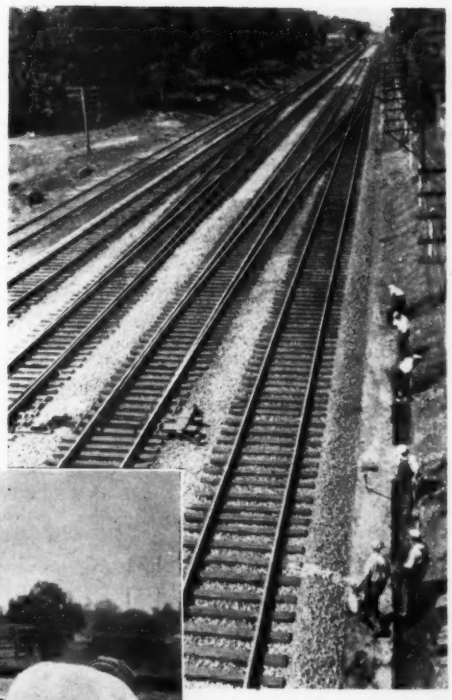
While the B. & B. and track forces are involved on almost every part of the railroad, the signal and track departments are concerned jointly with only 30 to 40 per cent of this mileage. However, with the increasing number of automatic signals and CTC installations, these two departments are becoming more closely related, and their efforts have been co-ordinated in such a way that train delays are eliminated and maintenance and construction are accelerated without confusion among the various members of these departments. The section foreman and signal maintainer have their individual problems, but if each goes his way without any regard for the other, it is not long until lack of co-operation results in failures either to track or signals, causing train delays. We have tried to educate these men to their respective responsibilities, as well as to the necessity of getting differences corrected in the field, before they result in failures.

For a long time the maintenance of insulated joints was the source of much dispute between the supervisors of both departments, largely because the insulation was not always renewed when it should have been. This situation was corrected by making it the track men's responsibility to see that the insulation is changed at the right time; occasionally this is done upon the request of the signal maintainer.

"Sometimes we must learn the hard way—by having signal failures or misunderstandings between employees in different departments. However, through discussions we have been able to iron out many of our differences. These discussions give us an opportunity to weigh all suggestions and to point out that co-operation, as well as a friendly relationship between fellow workmen, must exist to bring about the desired results."

Produce Results?

Bridge, and Signal Men



Right—Good Drainage Is Beneficial to the Track Circuits. Below—Joint Inspections of Switches in Block Signal Territory Have Proved Helpful

The installation of spring switches has increased, and it was agreed that it should be the responsibility of the signal maintainer to see that these switches have sufficient oil and that they are maintained in proper adjustment. The track department takes care of the remainder of the maintenance.

One of the important duties of both departments is to keep switches at interlocking plants and hump yards open during snow storms and, even more important, functioning at all times. In the fall, section foremen and signal maintainers jointly inspect snow-melting devices to determine that they will operate efficiently, and in the spring they see that the equipment is removed, painted if necessary, and stored. In the fall inspection, consideration is given to drainage around switches so that every drain will function and there will be no tie-up because ice interferes with the throwing of switches.

In an effort to try out the results of joint inspections of switches in automatic block signal territory, we have inaugurated a plan on certain districts whereby the track supervisor, the section foreman and the signal maintainer examine switches jointly once a month. A record is made showing the date of inspection and the defects found. We have found this advantageous, as a joint inspection makes it possible to effect repairs or to have repairs arranged for immediately. If a track man attempts to make repairs to a switch in automatic block or CTC territory without the signal maintainer being present, signal failures are likely to result.

Below—Co-operation Between Track and Bridge Men Pays During Washouts

Cooperation Starts at Top

I have attempted to point out the necessity for co-operation among the field forces, but primarily this spirit must start with the heads of the various departments, not only on the divisions, but on the districts and system as well. We have tried to formulate rules and practices which will lead toward a co-operative spirit in the field. Frequently the heads of departments confer on problems which confront them, and by solving these problems jointly they are able, by example, to show the field men that a co-operative spirit exists between the heads of their departments, and

should prevail among the entire personnel.

Sometimes we must learn the hard way—by having signal failures or misunderstandings between employees in different departments. However, through discussions we have been able to iron out many of our differences. These discussions give us an opportunity to weigh all suggestions and to point out that co-operation, as well as a friendly relationship between fellow workmen, must exist to bring about the desired results.

It Is the Results That Count

By A. L. Essman

Principal Assistant Signal Engineer, C. B. & Q., Chicago

CO-OPERATION as defined in the dictionary is the act of working or operating together to one end; joint operation; concurrent effort or labor; as the co-operation of the understanding and the will. Probably the reason that co-operation exists on the Burlington is because of a realization that all of us are being paid from the same pocketbook, and that where one department's equipment is interconnected with that of another, the problems arising are the joint problems of the departments involved, until a solution is reached.

An Example

While some may question the merits of such co-operation, it is the results of such a procedure that count. Several years ago the number of false-restrictive signal failures, because switch circuit controllers were out of adjustment, was quite large. In the investigations of these interruptions it was found that in some cases the stock rail of the switch was not being held in place properly, that the switch point was not fitting against the stock rail, or that the switch stand handles were fitting loosely in their socket. In this case the signal department was trying to solve a problem which, in reality, was a joint problem with the track department, and when that department was informed of the situation it readily improved conditions by providing additional adjustable braces for the stock rails and No. 1 rods, with adequate adjustments, so that the points could be adjusted without requiring the switch stand to be respiked. With these improvements there has been a reduction of approximately 85 per cent in these failures.

The Code of Rules issued by the Interstate Commerce Commission, and made effective September 1, 1939, contains several rules as to how signal equipment should function on certain track appliances. One of these rules is Section 60, as follows:

Switch-circuit controller connected at the point to a switch located in main track, or in other track equipped with track circuit and not equipped with facing point lock, shall be so maintained that when the point is opened ¼ in. or more on facing switch and ⅜ in. or more on trailing switch, track or control circuits will be shunted, or opened, or both. Switch circuit controller shall be fastened securely and contacts shall be kept clean, with minimum resistance and with contact openings of not less than 1/16 in. when open.

This rule, I believe, was not thoroughly understood by all those in the track forces. Some assumed that in view of there being ¼-in. leeway, it would be all right for the switch point to stand open 3/16 in. The facts are that 1/16 in. must be provided to obtain contact opening in the circuit controller when the switch point is against the stock rail. The remaining 3/16 in. must be provided for tolerances in the switch point lug connection, the throw rod connection to the cam of the controller, the bearing wear in the controller itself, expansion and contraction, and finally, sufficient stroke to exert enough contact pressure to perform the circuit function. Now it may appear that the signalmen are somewhat selfish in taking all of this ¼ in. for their adjustment purposes, but, nevertheless, it is necessary, and our track men acknowledge this fact, and again, co-operation pays off with improved performance.

Interlocked Switches

Power and mechanically-operated interlocked switches create problems of a different nature. One of the most troublesome of these is the running of the rail. The track department has indicated that the anchoring of the track is its job, and that all that it is necessary for the signal department to do is to inform the track forces where running rail is causing trouble and they take over the task. We do not expect that correction will be made over night, because the track forces are careful to install only the minimum number of anchors required. If on the first installation of anchors a sufficient number are not provided and trouble continues, they are informed and additional anchors are installed. This procedure is followed until complete correction is made. Another helpful thing that the track department is doing at interlocking switches is the grinding of switch points and stock rails. This was not on the request of the signal department, but rather what we may call a gratuity from the track forces.

"A co-operative spirit between the track and signal departments is nothing new on the Burlington. It was founded many, many years ago, and we of these departments today are merely endeavoring to perpetuate this spirit."

Track Circuit

The hidden element of signaling that reflects, to a large extent, the quality of track maintenance, is the track circuit. A track circuit is one part of signaling that has been studied for years by experts, who realize that problems are arising constantly in connection with this simple little circuit, affected by the type of ballast, the kind of treatment the ties have received, the weight of rail, the type of bonds that are in service, the density of traffic, the commodities that are being hauled, and by atmospheric conditions and drainage.

Drainage recalls the old section boss who advised his son, who had been following in his footsteps and who was just being promoted to roadmaster, always to remember that "every day you spend in the ditch in the spring is worth two days on the track in the summer." While drainage may seem to be primarily a benefit to the track, there is also a benefit to the track circuit, because track circuits operate much more efficiently when dry and free from dirt.

Now, assume for the moment that you are a signalman who has taken over a territory upon which signals have just been installed, on a line that has been operated for about fifty years without signals. Bear in mind that

about every track man on the territory in question has been doing his job 100 per cent up to this time. Now that signals are superimposed on this 50-year old line, there are certain to be new, joint problems, new equipment to maintain and, to some extent, new standards of maintenance. To bring about a successful transition to these new conditions requires forethought, because you cannot expect men who have been doing things one way for many years to change their methods enthusiastically unless they are given a thorough explanation of why these changes are necessary.

A co-operative spirit between the track and signal departments is nothing new on the Burlington. It was founded many, many years ago, and we of these departments today are merely trying to perpetuate it.

Do Not Destroy Initiative

By R. E. Sheehan
Supervisor of Bridges,
C. B. & Q., Chicago

AT TIMES we are all inclined to be irritable and critical and to become skeptical as to the wisdom, ability and aptitude of our subordinate and fellow workmen. In this way, however, we tend to destroy their initiative and thereby lose the benefits which should be derived from their experience, training and observation.

Let us be smart, let us handle our responsibilities in such a manner that we will obtain the highest possible efficiency from each unit of manpower employed. If we can so handle ourselves, our railroads will be the more successful, and our work will become a pleasure.

In considering the subject of co-operation among the track, bridge and signal forces, I presume that it refers to the field forces, including roadmasters, master carpenters, signal supervisors and maintainers, track foremen, bridge and building foremen and others serving in a supervisory capacity. On the Burlington, in general, this co-operation is good. Because of differences in personalities and of weaknesses of human nature, some exceptions have been noticed. In general, however, we feel that our interests are mutual.

"We need a track to carry our trains; we need bridges over streams; we need an adequate signal system to regulate trains so that they will move expeditiously and safely. Any one of the three alone would be useless. Why, then, should any employee be a departmental isolationist?"

We need a track to carry our trains; we need bridges over streams; we need an adequate signal system to regulate trains so that they will move expeditiously and safely. Any one of the three alone would be useless. Why, then should any employee be a departmental isolationist?

Rule 6 in our maintenance book of rules reads as follows: "In case of danger to company property, employees must unite to protect it." Any maintenance job, if left undone, might well become a potential hazard. Why then should we hold back?

Moving Signal Bridges

On emergency work we have always had full co-operation between the departments under consideration, and I might add, also from the field forces of the engineering, electrical and telegraph departments. On routine work, however, I could cite many specific cases where perfect co-operation has enhanced, and lack of co-operation has impaired the efficient performance of our work. I will only mention a few cases as typical examples of what we should encourage and of what we should discourage.

On one of our main-line divisions it was necessary to eliminate 22 double-track signal bridges and to move 23 others to new locations. Each of the latter was moved as a unit and reset, between trains. The work was done by division bridge men in conjunction with the division signal men, using a bridge derrick. To avoid delays to traffic, it was necessary to have the movements well planned and well timed, so that the dispatcher would have sufficient time to issue necessary bulletins and orders. This job was handled expeditiously and safely as a result of perfect co-operation between the signal supervisor and the master carpenter. Although the bridge and signal departments do not have very much work in common, I cannot recall any case where they failed to co-operate.

B. & B. and Track Forces

We do, however, have more in common with the track department. From my personal experience and associations, I have the most profound respect for the loyal and co-operative manner in which the native section foremen and their men have handled their jobs, and for the help they have given the bridge men. I have likewise always been impressed with the manner in which the bridge and track foremen have co-operated. We of the supervisory force might well give this matter some thought, for we might be influenced to work more co-operatively among ourselves, and thereby increase the effectiveness of our own performance.

"In conclusion, let us learn to know that the little personal pronoun 'I' and its possessive form 'my' can be used to much better advantage in their plural forms, realizing, that in a large organization, or on a large project, 'I' alone can do but little, whereas 'we,' working together, with perfect team work, in perfect harmony and co-operation, can accomplish much."

On our road each division has a master carpenter in charge of bridges and buildings, and three to four roadmasters in charge of track. These men have work in common. For instance, a track raise is to be made on a certain roadmaster's territory, where a bridge or two are involved. The roadmaster and master carpenter get together, plan their program, assemble the necessary materials and do the job as it should be done.

On another roadmaster's territory, on the same division, a similar job comes up. The roadmaster and master carpenter fail to co-operate. The track is raised and a run-off is made at each end of the bridge. Later, when the bridge is raised, and track men must

(Continued on page 1281)

Showing Piles with Wire Mesh Reinforcing in Place, Ready for the Application of Shotcrete. Note Shear Locks in Pile in Foreground.

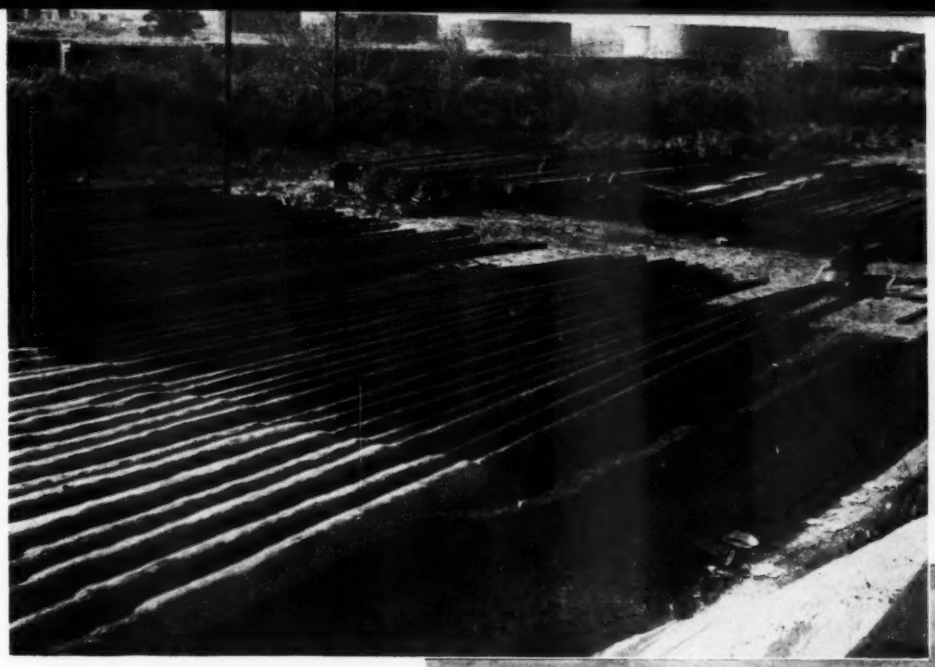
Concrete Jackets Protect Piles Against Marine Borers

Applying Shotcrete to a Pile. In This Procedure Each Pile Was Rotated Until the Concrete Jacket Had Attained the Desired Thickness

Because of severe damage by limnoria and teredo to the piles supporting two of its waterfront properties, this road pre-jacketed a large number of piles in making repairs to these structures as a protection against further attack, employing a shell of reinforced shotcrete. Of the piles so protected, all but one were driven without damage to the coating.

BECAUSE of severe marine borer attacks on the supporting piles of two of its important waterfront piers, the Southern recently completed repairs to the substructures of these piers. In these repairs creosoted piles, 75 and 80 ft. long, were pre-framed and jacketed with reinforced shotcrete before being driven, the shotcrete being applied so successfully that in the case of only one pile was the jacketing damaged in handling or driving.

During the life of these waterfront structures, much trouble had been experienced from marine borer infestation, although all of the piles in contact with the tide water had been treated with creosote. As early as 1921 it became apparent at one pier that protection of the piles against attack by limnoria would be necessary to insure them a reasonable length of life, and later many of the piles supporting both piers were jacketed in place with concrete, poured below the water line, to protect them against this type of destruction. This jacketing extended between the limits of one foot above high tide to one or two feet below mean low tide, the area most subject to limnoria attack. The concrete jackets were poured by the Hay method, in which a patented form is used to place concrete around piles to any depth. Most of the work was done necessarily at low tide and was slow and expensive. The jacketing program was continued on these two structures until all piles exposed to sea water had been jacketed between the limits mentioned. This protection, however, had two disadvantages: in the first place, the concrete was not reinforced, and secondly, it was placed after the piles had been



A Group of Piles to which Concrete Jackets Have Been Applied. In Right Background Wire Mesh Is Being Applied to Other Piles

Below—An Asphalt Emulsion Coat Is Applied to the Concrete Jackets to Help the Concrete Retain Its Moisture, to Aid Curing, and to Retard Disintegration

exposed for some time to the marine borer infestation.

Later, it was discovered that teredo were attacking some of the piles of both structures below low tide level, between the jacketing and the mud line, and a few years afterward it was found that this condition had become serious. By September, 1942, the limnoria and teredo combined had eaten entirely through some of the piles, in spite of the jackets, and inspection revealed a generally unsound condition in a large number of other piles in the structures.

In 1943, as a result of these conditions, it became necessary to replace the piles, except those which had several year's more life. In replacing these piles, it was decided to protect the new piles in contact with tide water with concrete jackets extending from one foot above high tide to a depth approximately five feet below the mud line. At the same time it was planned to pull or break off all old piles so that the source or breeding places of the borers would be eliminated. This was considered important.

In planning this repair work, it was known that 25 years ago the Port of Tacoma (Wash.), and that later U. S. Army Engineers at a West Coast port, had done some work in driving untreated piles which had been given a thin shell of shotcrete before driving. Accordingly, the Southern decided to follow a similar method in its work, except that the piles were to be pre-framed and given a preservative treatment of creosote, to refusal, before applying the shotcrete. It was expected that the cost of pre-jacketing with shotcrete would be considerably less than in-place jacketing, and that much better protection would be secured.

To anchor the shotcrete shells to the piles and prevent their movement during driving, a series of shear locks were cut in the surface of the piles before they were treated. It was originally planned to pre-frame the piles with square notches 4 in. by 4 in. by 1 in. deep, but it was found that circular notches could be drilled much more economically and would be entirely satisfactory. Accordingly, cylindrical shear locks, 4 in. in diameter by 1 in. deep, were drilled in all the piles to be pre-jacketed. Four such notches, spaced 90 deg. around the pile, were drilled 12 in. from both ends of the shotcreted section, and on the remainder of the shotcreted area of each pile two shear locks were drilled opposite each other for every foot of length, with each succeeding pair of notches rotated 90 deg. around the pile in relation to the preceding pair.

Before applying the shotcrete, the length of pile to be jacketed was wrapped with 2-in. by 2-in. by 12-gage galvanized wire mesh reinforcing, which was lapped 6 in. The reinforcing was held in place ¾ in. from the surface of the pile by means of specially-designed brads of 14-gage mild steel, which were made

(Continued on page 1283)

Maintaining Water Service Facilities—

Valves and Hydrants

Part II

By C. R. KNOWLES
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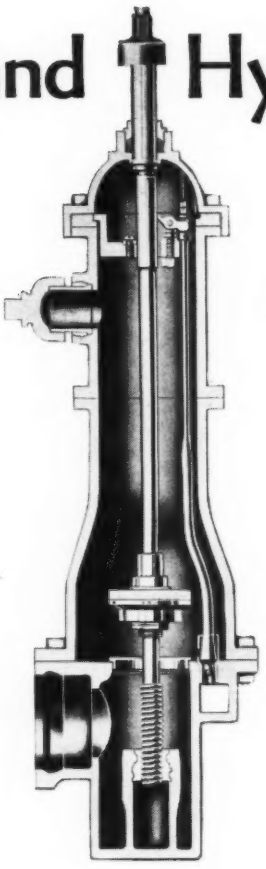
Illinois Central, Chicago

HYDRANTS and miscellaneous valves, as distinguished from globe, gate and check valves, which were covered in Part I of this installment,* are used extensively in railway water service. The more than 250,000 hydrants in use in this service may be divided about equally between fire hydrants and the hydrants used in coach yards and in general service. Miscellaneous valves, including foot valves, altitude and float valves, air-relief valves, reducing valves, stop cocks and other special valves, represent about four per cent of all valves in railway water service. Because of the greater unit cost of many of these valves, their total value is around 20 per cent of that of all valves in such service.

In its broadest sense, the term "hydrant" is used to designate any device used for the purpose of delivering water through a hose or direct from a valve with a short pipe outlet. The simplest form of hydrant is merely a valve with a short pipe connection. In its strictest sense, the term hydrant applies to a device especially designed for the purpose, including valve, housing and other essential appurtenances. Hydrants are of two general types; in one, the barrel of the hydrant extends above the ground, while in the other the barrel and hose connections are placed in a box or pit, the top of which is flush with the surface of the ground.



Six-Inch Fire Hydrant with Rubber-Faced Valve Seat

Of first importance are hydrants designed for fire protection. Such hydrants used in railway service differ materially from the smaller general-purpose hydrants both in size and design, and conform to standards established by the American Water Works Association and the National Board of Fire Underwriters. Although many of the older fire hydrants in railway use have a four-inch connection to the main, the National Board of Fire Underwriters do not consider satisfactory a connection less than six inches. As a result, new installations are provided with a six-inch pipe connection. This size valve has a five-inch hydrant valve, with two 2½-in. hose outlets. In addition, some hydrants have a four-inch steamer connection.

The principal difference in fire hydrants is in the design of their valves, which are of three general types, as follows: (1) the gate-valve type, in which the gate moves on the stem in much the same manner as in an ordinary gate valve; (2) the positive type, in which the valve closes against the flow of water as in a globe valve; and (3) the compression type, which also operates in the same manner as a globe valve, except that it closes with the flow of the water, which assists in its closing and helps hold the valve disc in place. All fire hydrants are provided with drip valves to permit self-draining of the water from them when not in use, to prevent their freezing during severe cold weather. Many hydrants are provided with an auxiliary valve between the hydrant proper and the main, to permit shutting off water to the hydrant to permit necessary repairs.

Hydrant valves are similar in construction to gate and globe valves and the same general procedure should be followed in maintaining them. Fire hydrants are used at infrequent intervals, usually only in case of fire, for fire drills, or for flushing mains. It is of first importance that they be maintained in such condition that they will be serviceable when required. One important detail of maintenance is to keep them drained during cold weather, and to this end every precaution should be taken to see that the drip valve is operative. Where ground conditions do not permit adequate drainage, the drip valve should be closed and provision should be made to pump out the hydrant barrel as required.

Fire hydrants are designed for fire protection alone, and their use for any other purpose, such as flushing sewers, filling tanks, or other general purposes, should be discouraged, except in extreme emergencies. It is not uncommon to see fire hydrants used as drinking fountains and for filling buckets and barrels. This is extremely poor practice, as it is impossible to

No. 15 of a Series

This is the second part of a two-part installment dealing with the maintenance of various types of valves and hydrants in use in railway water service. In this part the author deals primarily with the design, installation, operation, inspection and maintenance of hydrants, and of foot, float, altitude, pressure-relief, air-relief and tank valves. In Part I he dealt similarly with globe, gate and check valves.

*Published in the October, 1945, issue.

keep them in good working order under such conditions. If used exclusively for fire protection, they require but little maintenance.

Hydrants should be inspected at regular intervals to see that they are in good working order. At the time of each inspection, the valve should be opened and closed and the seats should be checked for any possible leakage. The condition of the drip valve, lubrication, packing and general condition of the hydrant should also be checked and any necessary repairs made promptly. Hose connections should be examined to see that they are tight in the barrel; protecting caps should be in place and attached to the hydrant by a loose chain.

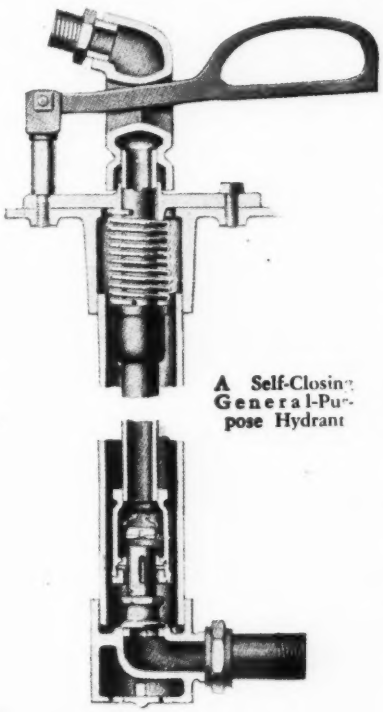
Hydrant wrenches should be readily available for the operation of hydrants. They should not be attached to the hydrant, but should be kept in a convenient place for use when required. Pipe wrenches should not be used to operate the valve as they will so damage the operating nut that the regular wrench will be inoperative.

Fire hydrants should be painted a distinctive uniform color, and weeds and grass should be removed to permit their being located readily in the event of a fire requiring their use. They should be protected from possible damage when located in driveways or other places where there is any possibility of their being struck and damaged by vehicles.

It is advisable to examine fire hydrants immediately after they have been used, particularly during the winter months, to be sure that they are properly drained. If this is not done, water may remain in the barrel and form ice, preventing operation of the valve, or the barrel may burst. The presence of ice or water may be determined by dropping a weight, suspended by a cord, in the barrel of the hydrant.

General Service Hydrants

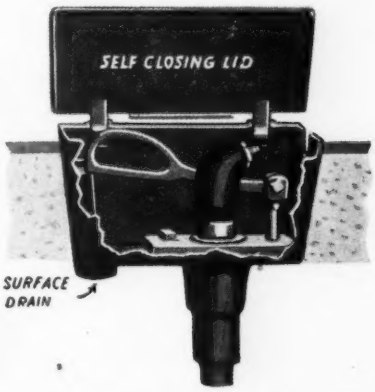
Hydrants for general service are of many different types and are used for many purposes, such as supplying



A Self-Closing General-Purpose Hydrant

water at coach yards, passenger stations, cinder pits and stock yards, and for sprinkling lawns and similar purposes. Next in importance to fire hydrants are those used for supplying water to railway coaches and cars in coach yards and at passenger stations, as such hydrants are under constant surveillance and criticism by the United States Public Health Service. So exacting are the requirements of the U.S.P.H.S. that few, if any, existing installations meet with its approval, and to comply with its requirements for new installation presents problems of construction, maintenance and operation that are almost insurmountable. Coach yard installations consist largely of the conventional types of hydrants which are placed in pits or boxes, with their tops flush with the platform or ground surface, except where conditions permit the use of the post-type of hydrant, with the barrel extending above the surface of the ground.

The problem of supplying water to



Flush-Type Coach-Yard Hydrant

high-speed Diesel trains has given increased importance to the maintenance of main-line coach and Diesel locomotive watering facilities since, in addition to meeting the exacting and sometimes unreasonable demands of the U.S.P.H.S. as to sanitation, the watering operations must be timed to make every second count if schedules are to be maintained. These facilities should be given close attention and should be subjected to frequent inspection and immediate repairs, when necessary. Valves, hose connections and other adjuncts, including booster pumps where used, should receive prompt attention to avoid any possibility of their failure to function properly, with resultant delays.

Adequate surface drainage about hydrants is all too often neglected and forms the basis of most Health Service complaints, because, where water is allowed to accumulate in the hydrant boxes, there is always the possibility of the hose connections becoming contaminated. Ground drainage, too, is not always satisfactory, and where hydrants are used frequently, trouble in this respect may be overcome by connecting the drip valves to sewers or drains.

Miscellaneous Valves

While almost every kind and type of valve is used in railway water service, many of them are designed for special purposes and are used only to a limited extent. Therefore, this discussion will be confined to those used most widely and that are common to nearly all water service installations.

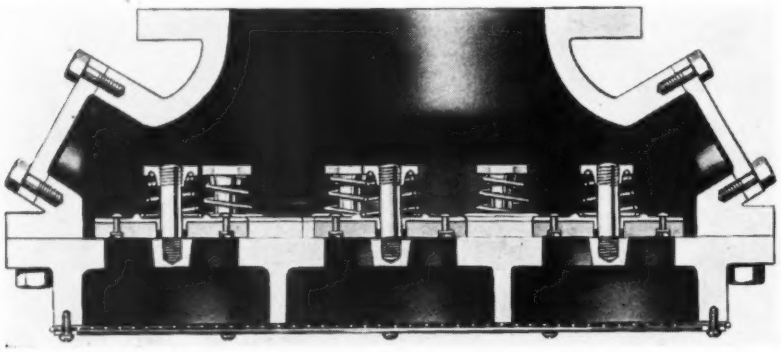
The foot valves in most common use are of the flap or clapper type, us-

The Water Service Series

The 14 articles in this series, published previously, include the following:

(1) Introduction (April, 1944)
(2) (3) (4) Sources of Supply (May, June & July, 1944)
(5) The Maintenance of Pumps — Reciprocating Pumps (Aug., 1944)
(6) The Maintenance of Pumps — Centrifugal Pumps (Sept., 1944)
(7) The Maintenance of Deep Well Pumps (Oct., 1944)
(8) Miscellaneous Pumps (Dec., 1944)
(9) (10) Power Units (Jan. & Feb., 1945)
(11) Power Transmissions and Controls for Pumps (April, 1945)
(12) Pipe Lines — Part I (June, 1945)
(13) Pipe Lines—Part II (Aug., 1945)
(14) Valves and Hydrants — Part I (Oct., 1945)

ually with leather seats. The valves are hinged and are provided with stops that prevent their opening beyond the point of positive return. Other types of foot valves in less general use are of the multiple-valve type, in which the valve decks contain a number of rubber valves which operate in the same manner as pump valves. Foot valves are usually provided with screens of cast iron, perforated sheet metal or wire mesh.



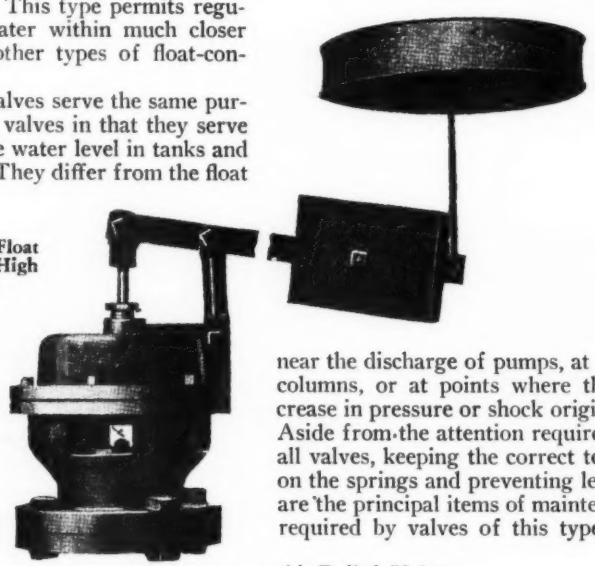
Multiple-Seat Type Foot Valve

Foot valves are used on the ends of suction lines where the pump is placed above the source of supply, their function being to permit the filling of the suction line with water when starting the pump. They are not always used on reciprocating pumps, except where a high suction lift is involved, but they are essential to the operation of ordinary centrifugal pumps, unless the water flows to the pump under a head or an air ejector is used. Some self-priming centrifugal pumps of the portable type operate without foot valves, but these are rarely used as stationary pumps in railway water service.

The net area of the opening through the foot valve should be somewhat in excess of the area of the suction pipe to avoid excessive friction. One of the principal difficulties encountered with foot valves is caused by material lodging under the valve seats and causing them to leak. To prevent this, a screen should be provided where leaves, fish or other foreign matter may enter the suction. The area of the screen should be from three to six times that of the suction pipe to lower the velocity of the water passing through it, thus reducing the possibility of its becoming clogged with debris. Foot valves are usually submerged and are, therefore, somewhat inaccessible. For this reason they are sometimes neglected until they become inoperative. They should be so installed that they can be lifted from the water and examined at regular intervals.

Float valves are designed to control the water level in tanks and reservoirs. They are commonly used to control the supply of city water or other purchased supplies and, as such, are as important as a cash register. They are also used where the tank is located some distance from the pumping station, and in connection with the automatic control of pumps. These valves are of various types, some of which are similar in design to an ordinary lift valve, with a simple lever action to close them, while others are of the balanced-valve type, the principal feature of which is to cushion the valve operation. All such valves are actuated by floats which rise and fall with the water level. In some designs the float operates a small pilot valve which, in turn, acts upon the main valve. This type permits regulating the water within much closer limits than other types of float-control valves.

Altitude valves serve the same purpose as float valves in that they serve to control the water level in tanks and reservoirs. They differ from the float valve in that they operate as pressure control valves. One of the more commonly used types is made with a balanced main valve, which is operated by a small pilot valve and diaphragm. In normal operation the pilot valve is closed and the valve is held open by the pressure of the incoming water. When the desired head or pressure of water is reached, the pilot valve opens, applying pressure to the diaphragm or top of the main valve, closing it against the pressure. The valve opens automatically when the head of water in the tank is lowered. Altitude valves are located in the supply lines leading to tanks, being usually placed in underground pits.



Balanced Float Valve for High Pressures

The maintenance of both float and altitude valves is largely a matter of protecting them from frost and keeping them clean. Float valves should be located at a point in the tank low enough that they will be submerged. In many cases the formation of ice in tanks is such that it may damage the valve, float, and even the riser pipe. In such instances the alternative is the installation of altitude valves in the tanks.

Pressure-Relief Valves

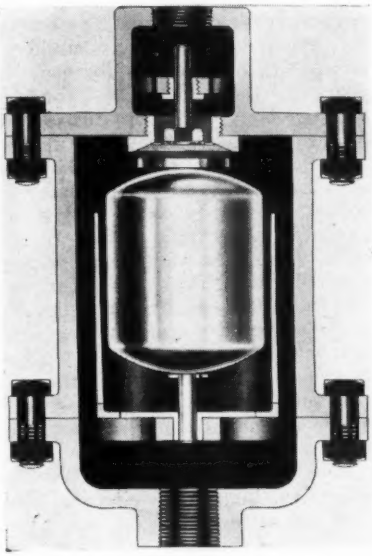
The purpose of pressure-relief valves is to prevent shocks and water hammer in long pipe lines or where the velocity of the water is high, such shocks being induced by sudden stoppage of the flow or by pulsations in the line from various causes. These valves are similar in construction to the ordinary safety valve in that they are held in a closed position by a spring, the tension on the spring determining the pressure required to open them. They are usually located near the discharge of pumps, at water columns, or at points where the increase in pressure or shock originates. Aside from the attention required for all valves, keeping the correct tension on the springs and preventing leakage are the principal items of maintenance required by valves of this type.

Air-Relief Valves

Air-relief valves are essential to the operation of long discharge lines where they are laid in undulating country, their purpose being to release the air from such lines as it forms at peaks or high points in the

lines. If air is allowed to accumulate in these lines, the flow of water is restricted, pumping pressure is increased, and the delivery of water is greatly decreased, particularly where centrifugal pumps are used. While ordinary manually-operated valves are sometimes used to release the air, automatic valves are more effective and desirable.

Automatic air-relief valves are of various kinds. A commonly used type consists essentially of a chamber containing a float and valve. When air



Poppet-Type Air-Relief Valve

accumulates in the pipe line the float drops, opening the valve and allowing the air to escape. When water enters the chamber, the valve closes the air vent and prevents the escape of the water. Other types of air-relief valves operate in a similar manner, with an arrangement of levers and floats, but the same general principle applies to all of them.

Installation

There is no fixed rule as to the necessity for the installation of air-relief valves; however, safe practice requires their installation at all high points in pipe lines if the lines are of any considerable length. They should always be installed so that they can be readily inspected. When the pipe line is located in a deep trench, it is sometimes the practice to install the valves in pits to permit ready access for examination. In other cases the valves are located near the surface of the ground. In any event, they should be protected from frost and examined at regular intervals to see that they are in good operating condition. They require little maintenance except where sediment is carried by the water, in which case they may require cleaning occasionally.

Tank Valves

Tank valves are, of necessity, quick-opening valves, usually operated by a rope or chain from the tenders of locomotives. Those in common use are of two general types, (1) the flat-clapper valve, with a rubber-faced seat, which is opened by means of a hinged lever; and (2) the plunger-type, which consists of a casting with a beveled seat faced with leather, and a brass plunger with a beveled face, which seats against the leather seat. The latter type valve is opened by means of a fulcrum lever located at the top of the tank. Both types of valves are closed automatically by the pressure of the water in the tank when the operating rope is released by firemen or others taking water. As a result, the seats of these valves are subjected to severe uncontrolled shocks each time water is taken, which may be 50 times or more daily. Because of these severe operating conditions, tank valves present one of the more important problems of water service maintenance. The lift of the valve should be carefully adjusted to reduce the shock of closure as much as possible and, at the same time, permit maximum flow of water to avoid delays in taking water. Experience will determine the necessity for renewing the seats because of ordinary wear. Such renewals should not be neglected.

In the colder climates, trouble is sometimes experienced with tank valves freezing. As a rule they are located at the bottoms of tanks, but in extremely cold climates it may be advisable to place them at points high enough in the tanks that they will not be affected by ice that may form on the bottoms. Sticks, leaves, birds and other debris often cause tank valves to leak. When repairs are made to tanks, therefore, they should be carefully cleaned and all chips or particles of wood removed. Where tanks are roofed, they should be made tight to prevent birds entering or making nests in the roofs.

This Poster, No. 267, Constitutes the November Installment of "All the Year-Every Year Safety Program" of the Safety Section, Association of American Railroads

Co-Operation Pays

(Continued from page 1275)

come back to raise the approaches, this results in additional slow orders and additional expense. This is not just imaginary; it has happened on your road and mine. Let us not be that way; let us co-operate at all times.

A superintendent or other officer in going over the railroad notices a rough spot near the end of a bridge. He notifies the roadmaster and the master carpenter. Does the roadmaster say that the fault lies with the bridge and the master carpenter that the difficulty arises from the track? Or do they go together to the site to investigate? Obviously, they should do the latter. In so doing, they might decide that a wider shoulder is needed, and that to hold the shoulder the bulkhead might need lengthening or repairing. Of course, the ties adjacent to the bridge must be tamped up as a routine job.

The matter of taking care of crossing repairs is also a joint job. Also, where crossings are close together and we have snow and ice to contend with, prompt flanging is necessary, and especially in large terminals, co-operation is needed on this work.

On through steel bridges with ballast decks, the bridge and track men should get together on the changing of ties and the keeping of drain holes open. In general, on our road, the bridge and track men do co-operate on all of the various types of jobs mentioned.

In conclusion, let us learn to know that the little personal pronoun "I" and its possessive form "my" can be used to much better advantage in their plural forms, realizing, that in a large organization, or on a large project, "I" alone can do but little, whereas "we," working together, with perfect team work, in perfect harmony and co-operation, can accomplish much.

Undetected Washouts Result in Two Accidents

FOUR persons were killed and eleven others injured in two train accidents which were attributed to undetected washouts, according to recent Interstate Commerce Commission reports. The first accident, in which three persons were killed, occurred during a rainstorm about 11:03 p.m. on August 30, 1945, near Gammage, Ga., on the Atlantic Coast Line. The second, which resulted in one death and eleven injuries, also took place during a rainstorm, but near LeRoy, Minn., on the Chicago, Milwaukee, St. Paul & Pacific, about 7:02 a.m., on September 17, 1945. Abstracts of the reports of these accidents follow.

On the A. C. L.

The accident on the Atlantic Coast Line occurred in single-track territory, on a line extending northward from Waycross, Ga., 111.7 miles, to Albany, in which territory trains are operated by timetable and train order. The track structure at the scene of the accident consists of 100-lb. rail and is ballasted with mine slag, which fills the cribs and extends about 54 in. beyond each rail. In the vicinity of the accident, the track extends in a north-south direction, and is laid on a 4-ft. fill which is about 30 ft. wide at the bottom and 17 feet wide at the top.

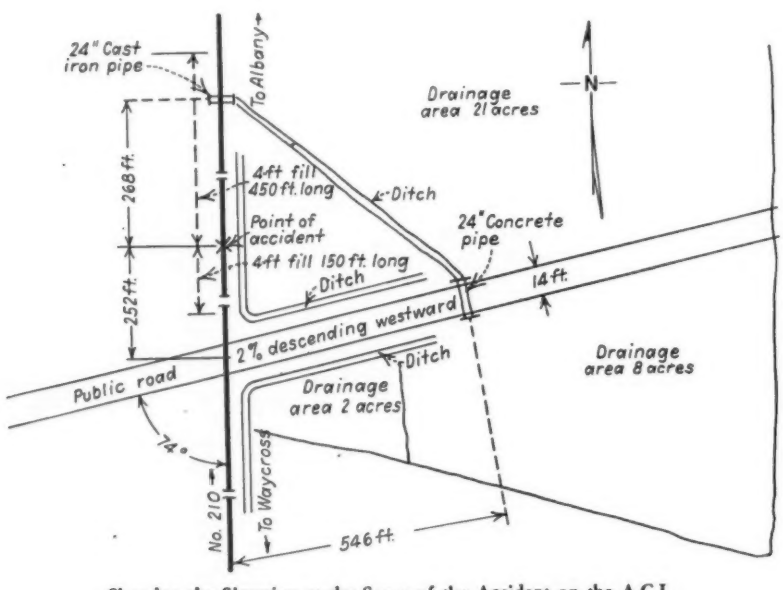
An unimproved highway slopes westward toward the railroad on a grade of 2 per cent and crosses it at a point 252 ft. south of the point where the accident occurred. Drainage ditches are provided along both sides of the highway east of the crossing, and along the east side of the railroad track. Another diagonal drainage ditch, about 600 ft. long, connects a culvert under the highway at a point 546 ft. east of the track, to a culvert through the track embankment at a point 520 ft. north of the crossing, and 268 ft. north of the point of derailment, these various ditches draining a total area of approximately 31 acres east of the railroad and lying on both sides of the highway.

Subgrade Washed Out

On the day of the accident, No. 210, a northbound, third-class freight train, consisting of a locomotive and 26 cars, passed Sylvester, Ga., 2.6 miles south of Gammage, and the last open office, at 10:52 p.m., 1 hr. and 4 min. late, and a short time later, while running at an estimated speed of 35 m.p.h., was derailed 3.0 miles north of Gammage. The locomotive and first 16 cars left the rails. Three persons were killed, and the derailed equipment was badly damaged. After the accident it was found that the subgrade had been washed out in the vicinity of the accident to a depth of 4 ft. throughout a distance of 123 ft., and that the eroded area extended 14 in. inside the east rail. In addition, marks were found which indicated that water had been from 12 to 18 in. above the top of rail near the point of derailment.

In the investigation which followed, it was brought out that although several heavy showers had fallen during the evening before the derailment occurred, the section foreman in charge of the track did not consider them of sufficient volume to require an inspection. Shortly before the accident, a motorist on the nearby highway had informed the operator at Sylvester that a cloudburst had occurred a short time before in the vicinity, and that water two feet deep covered the highway. However, No. 210 had already passed the station.

Following the accident, examination of the area showed that water had flowed over the crossing of the railroad and highway, and that a considerable amount of sand had been deposited in that vicinity. Prior to the rain in question, the ditch on the south side of the highway had become filled with dirt at several places, and it was evident that this had caused a considerable volume of water to be diverted northward into the area which is drained through the culvert under the track, thereby increasing the amount of water in that area. It was also evident that the track fill had been eroded by a current of water moving practically parallel to the track, and the conclusion was reached, therefore, that the accident had been caused by a washout.



Showing the Situation at the Scene of the Accident on the A.C.L.

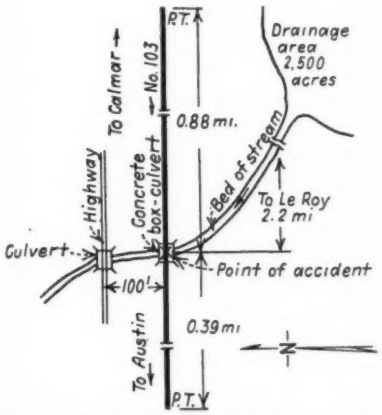
Derailment on Milwaukee

The accident on the Chicago, Milwaukee, St. Paul & Pacific occurred on a single track line extending westward from Calmar, Ia., 69.2 miles, to Austin, Minn., a line over which trains are operated by timetable and train order. The derailment took place on a tangent section of track where the maximum permissible speed for the train involved was 50 m.p.h.

No. 103, the train derailed, a westbound, first-class passenger train consisting of a locomotive and seven cars, departed from Calmar, the last open office, at 5:57 a.m., 7 min. late, and some time later, while moving at a speed of about 50 m.p.h. according to the tape of a speed recorder on the locomotive, was derailed. The engine

and first three cars left the track. The engineer was killed, eleven other persons were injured and the derailed equipment was badly damaged. It was raining at the time.

There was no defective condition of the engine before the accident, and there was no indication of dragging equipment. According to the fireman there was water adjacent to the track at several points between Calmar and the point where the accident occurred,



Where the Derailment Occurred on the Milwaukee as a Result of Water Damage

but there was no indication of defective track. The first indication of defective track was a sudden dropping of the locomotive.

The track structure in the vicinity of the accident consists of 85-lb. rail, and is ballasted with cinders and gravel to a depth of eight inches. The track is level and is laid on an earth fill 21 ft. high, about 70 ft. wide at the bottom and 18 ft. wide at the top.

Directly at the point of derailment, a concrete box culvert, 8 ft. high and 14 ft. wide, extended under the track. At the center of the culvert, the side walls were 3 ft. thick at the top and 4 ft. thick at the bottom. The footings of the walls extended 3 ft. below the normal ground line. The top of the culvert was 1 ft. 8 in. thick at the center, and was reinforced with I-beams. Normally drainage from a 2,500-acre tract of land south of the railroad drains into a stream, which flows northward through the culvert under the railroad.

Culvert Undermined

In the examination which followed the accident, it was found that the track structure directly above the culvert had dropped about four feet. Further examination revealed that flood water had undermined the footings of the culvert walls at one end, and that each wall and the roof of the culvert had been broken into three parts. A considerable part of the lower portion of the fill next to the outside face of each wall was washed away.

Marks were found which indicated that water on the south side of the fill had risen to a point about five feet above the top of the culvert. The condition of the fill and the culvert, and the positions of the engine and equipment after the accident, indicated that at the time the train was nearing the point where the derailment occurred, the culvert, the upper part of the fill, and the track, were in their normal positions. Evidently the fill and culvert collapsed under the weight of the engine.

The investigation showed further that a heavy rain had fallen intermittently in that vicinity during the day and night preceding the accident, but that the section foreman in charge of the track did not consider the volume of rainfall sufficient to require a track inspection. Drainage facilities in this area had been adequate for 43 years prior to the accident.

Evidently the volume of water flowing toward the fill was greater than the capacity of the culvert, and the water rose to a point several feet above its top. In the opinion of the roadmaster, a whirling motion existed at the entrance to the culvert when the water from above and both sides was directed into it, with the result that the earth under the culvert and on both sides was carried away.

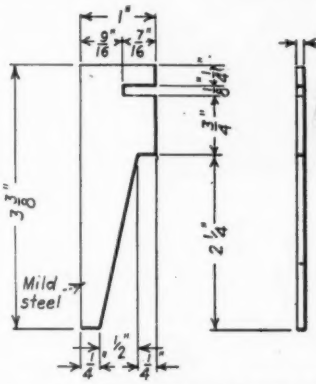
It was the conclusion of the commission that the accident was caused by a washout.

Concrete Jackets

(Continued from page 1277)

in the company's roadway shop. These brads have tapered ends which where driven into the piles, and a horizontal slot in the head of each brad for holding the wire. A shoulder ¾ in. from the slot automatically provided for correct spacing of the mesh from the pile, and when the mesh was inserted in the slot, a blow with a hammer closed the end of the slot, thus securely holding the wire. The brads were spaced about 9 in. apart around the pile at intervals of about 20 in. throughout the length of the jacketed section. At the ends of the section, the mesh reinforcing was wrapped with six turns of No. 9-gage galvanized wire, which served to pull the reinforcing in, and also to provide extra reinforcing at this point.

To apply the shotcrete jackets, the piles were placed horizontally on skids, which were so spaced as to keep bending of the piles to a minimum. It was originally planned to steam clean the piles before applying



Detail of the Brads Used to Hold the Wire Mesh Reinforcing in Place

the shotcrete, to provide a good bond, but this was found to be unnecessary.

The shotcrete was applied with pneumatic guns and each pile was rotated in front of the guns until the concrete was deposited to the desired thickness of 1½ in. After placing the shotcrete, the piles were wrapped with burlap and were cured by being kept wet with a water spray for four days. Following this, the burlap was removed and the concrete was given a coat of asphalt emulsion to help retain its moisture and to aid in its further curing. It is thought that the asphalt emulsion will also assist in retarding disintegration of the jackets.

In the first piles jacketed, a few small circumferential cracks developed at the splice in the wire mesh, but they extended in only ½ in. from the surface. It was discovered that these cracks were caused by inadequate lapping of the reinforcing, and after the lap was increased to six inches no more cracks developed.

The reinforced jackets, which varied in length from 16 to 43 ft., stiffened the piles greatly. To handle the jacketed piles, a locomotive crane was used with a two-point pick-up. The piles, some of which were 80 ft. long, were driven by a floating pile driver with 75-ft. leads and a No. 1 Vulcan single-acting hammer having a 5,000-lb. ram. They were driven without difficulty, with only one of them suffering any damage to the jacket.

Part of the pre-jacketing was done by railroad forces and the remainder under contract by the Pressure Concrete Company, Newark, N.J.

What's the ANSWER?

Effect of Curve Reduction

What effect does curve reduction have on the life of track materials? On routine track maintenance? Why? What other considerations are involved?

Savings Only By-product

By Engineer Maintenance of Way

Normally, curvature is not reduced primarily or wholly because of savings in track materials that can be effected by doing so. Therefore, any savings that may accrue because of longer life of these materials is merely a by-product of the work. Curves are reduced or eliminated primarily to improve operating conditions, to permit higher train speeds or to get away from difficult maintenance conditions.

There are, however, certain favorable effects on track materials as a result of curve reduction or elimination that cannot be ignored. In general, the sharper the curvature the more rapid the curve wear on the rail, making renewals more frequent. This has an adverse effect on ties and uses up more track materials and makes general surfacing necessary more frequently than where rail renewals are required less often.

Determine For Each Case

By E. E. King
Professor of Railway Civil Engineering, University of Illinois, Urbana, Ill.

Some progress may be made toward a solution of the problems presented in the question by a general analysis of some of the problems that arise from curvature as it affects track and rolling equipment under various conditions of maintenance and operation.

The force required to change the direction of a more or less rigidly-fixed locomotive driver frame, or of a partially-fixed locomotive or car truck on a curve, causes an added pressure against the outside rail by some of the wheels and against the inner rail by others, even though the train moves at the speed for which the superelevation was designed. This restrained lateral pressure of the rolling equipment against the rails contributes materially to the overturning force against the rails, which sometimes reaches rather high figures. For flat curves, say of 1 deg., the binding and the lateral thrust are not so severe as for sharp curves, say of 10 deg.; and beyond a certain point the pressure is probably proportional to the degree of the curve, varying with the length of the wheel base.

In spite of equalizers, locomotive wheel loads are not always distributed uniformly while the locomotive is on a curve. The result is that the stresses in the rail are increased materially at the points where the loading becomes excessive. In addition, the vertical components of axle loads are seldom the same on the two rails of a curve. This accumulated unbalancing may be sufficient to break a rail or to crush or mash the head of the rail, especially the inner one, often producing a lip on its outer edge which sometimes breaks off in the form of slivers.

Again, this unbalancing is likely to be more severe for sharp curves than for flat ones. Furthermore, because of the difference in length between the outer and inner rails on a curve, there is, of necessity, some slipping of the wheels on either the outside or the inside, since they are fixed rigidly to their axles, to cause some friction and wear and tear on equipment. Theoretically at least, this slipping is independent of the degree of the curve, varying directly with the amount of central angle.

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in February

1. *What characteristics should a satisfactory gravel ballast possess? What range of sizes is most desirable? Why?*

2. *Should section tool houses be floored? Why? What is the best type of flooring?*

3. *Under what conditions do rails tend to tip over on curves? What can be done to prevent it? Is the outer or inner rail more affected? Why?*

4. *When depositing concrete within cofferdams where pumping is necessary, is it safe to stop the pumps at the end of the day, allowing the concrete to be submerged during the night? If so, what are the advantages? What precaution should be observed? If not, why?*

5. *What is the shortest length of guard rail that is satisfactory under high-speed trains? Is there any difference for facing-point and trailing-point turnouts? For frogs of different angles? For curve or tangent? Why?*

6. *What are the outstanding trends in railway pumping practices? What factors are accelerating these trends? Retarding them?*

7. *Should the punching in tie plates for the rail spikes be larger, smaller or of the same size as those for the hold-down spikes? Why? What should be the dimensions with reference to the spikes?*

8. *To what extent is it feasible to give lumber and timber for buildings fire-retardant treatment? Should this replace preservative treatment? To what extent? How is painting affected?*

Because of these several influences of motive power, curved track requires more frequent lining than straight track, while rails, fastenings, ties and rolling equipment wear more rapidly and require more attention and replacements on curved track than on straight track. Everything else being equal, the track structure is frequently made a little heavier and a little stronger on curves, and the use of signals and other safety devices a little more imperative, at least where excessive curvature is involved. Besides, the additional tractive force required to overcome friction caused by flange action, by the slipping of the wheels and by disturbances resulting from unequal wheel loadings, is a source of expense for fuel, water and oil. The conditions are obviously more severe under heavy, high-speed traffic than under lighter service, say on branch lines. On many lines automatic rail and flange lubricators have reduced substantially the wear and the frictional force, but these devices are, in themselves, a source of some expense.

Because curves on single-track lines must be elevated for speeds in both directions for both freight and passenger trains, over ascending and descending grades, the elevation in many cases is likely to be somewhat under that called for by the average speed on level track, for heavy freight trains experience considerable difficulty in negotiating even average superelevation at low speeds. This unbalancing is a source of discomfort to passengers on high-speed trains. The difficulties are not so serious on double-track lines where the superelevation must be balanced between freight and passenger trains in one direction only; yet there does exist a certain amount of limitation and corresponding discomfort to patrons on passenger trains.

Superelevation usually creates some additional problems in bridge construction and maintenance; and curved track is more difficult to line and surface than straight track. There is also more danger of derailments on curves as a result of worn equipment and low joints, and these are generally more disastrous than similar derailments on tangents. Furthermore, the list of accidents from other causes is usually greater on track where vision is restricted by curvature; while all curvature imposes some limitations on speed.

Figures compiled by members of Committee 16 of the American Railway Engineering Association and published in the Proceedings for 1938, show that under average conditions the cost of curvature is about $0.00121 per 1,000 gross ton-miles per degree of central angle. According to these values, the savings that would be affected by the elimination of 100 deg. of curvature for 1,000,000 gross ton-miles of traffic would be

$$100 \times 1{,}000 \times \$0.00121 = \$121$$

This figure capitalized at, say, 4 per cent, would fix $3,025 as the expenditure that would be justifiable to eliminate this amount of curvature. Where speed is of paramount consideration, however, as it has come to be for most main-line service, many times this amount might be spent justifiably to overcome any limitations that restricting curvature might impose in fixing train schedules. Obviously, this value for the cost of curvature would have to be determined separately for each particular case.

Are Guard Rails Necessary?

Should open-deck bridges have inside guard rails? Outside guard rails? Why? How should they be applied? What is the best method of insuring the correct spacing of the ties?

Not Really Guard Rails

By Supervisor Bridges and Buildings

Outside guard rails, as they are commonly called, are not so much guard rails as tie spacers. They were called guard rails or guard timbers in the days before guard rails were applied between the running rails, as is the general practice today, and the name has merely persisted. Then they were thought of as really being guard rails to prevent derailed trucks from getting too far away from the rail. However, except for preventing the bunching of the ties, they were more of a detriment than a help, for as soon as the leading wheels of the derailed trucks struck the timber, they were retarded and this resulted in a more pronounced sluing of the trucks, which often resulted in severe damages to the structure.

Inside guard rails prevent the sluing of the derailed trucks and keep them alined near the running rail so that they cause the minimum of damage to the structure. They should be made of T-rails of the same or somewhat lighter section than the running rails, but they should never be higher than the running rails. My preference is to use them with tie plates, but if this is not done, they should be well braced with rail braces. The outside guard timbers should then be located about 18 in. outside the gage line of the running rail, where there is no likelihood that the derailed wheels will reach them.

Functions Are Different

By General Inspector of Bridges

In the first place the functions of inside and outside guard rails are so dissimilar that they cannot be discussed together, but must be considered separately. The function of the inside guard rail is to keep the wheels of derailed trucks straight and parallel with the track, and to prevent the lateral movement of the wheels that will almost certainly create severe damage to the track and possibly to the entire structure. On the other hand, the outside guard rail is expected to maintain the ties at their normal spacing and to prevent bunching under normal traffic as well as in cases of derailment.

Prior to the war it was a widespread practice to apply inside guard rails to open-deck bridges, in the form of T-rails of somewhat lighter section than the running rails in the track. These were extended some distance beyond the bridge in the direction of oncoming trains, where they were brought together and lowered to the level of the base of the running rails. In some cases the ends of the rail were fastened to specially-designed nose castings which were beveled off to the level of the tops of the ties, to insure that dragging parts from cars would not catch the guards.

By these means, trucks that had been derailed before they reached the bridge were straightened up, in theory at least, and were brought back to alinement so that damage to the deck timbers was kept at the minimum. In other words, the straightened trucks were not so likely to bite into and damage the ties and guard timbers, or to cause the train to break in two, as is quite likely to happen where the derailed trucks are permitted to slue without restraint.

With the opening of the war and the insistent demand for melting steel, many of these inside guard rails were removed and sent to the steel mills to be melted and used for war purposes. Relatively few of these guard rails have been replaced to date, and in discussing the matter with

bridge and other engineering officers on other roads, I find that there seems to be a feeling in some quarters that the inside guard rails have heretofore been invested with too high a value, and that they are not so badly needed as had been thought. They point to the fact that, with the heaviest traffic ever handled by the railways, at the highest average speed in railway history, there has not been a serious accident that could be attributed to the absence of inside guard rails.

To my mind this is a completely erroneous attitude. While the statement may be true, the fact that an event has not taken place is no assurance that it could not have happened. Whenever an open-deck bridge is not equipped with inside guard rails, the stage is all set for a serious accident, and the fact that wheels were not derailed on or in the vicinity of the bridge cannot be credited to the absence of the guard rail.

Obviously, it costs a considerable sum of money to equip all of the open-deck structures on a large road with inside guard rails. But this cost should be considered as insurance, on which basis it is relatively cheap, since the first payment is the only premium that is required. I have seen a number of derailments involving open-deck bridges that were not equipped with inside guard rails, the cost of any one of which would have equipped many bridges with such guard rails.

Injuries to the Base of a Rail

What injuries to the base of a rail require its replacement? Why?

Bases Are Easily Broken

By A. E. Perlman
Chief Engineer, Denver & Rio Grande Western, Denver, Colo.

Injuries to the base of a rail rise principally from moon-shaped breaks, nicks or gouges that are caused by wheels in derailment, accidental gouging of the rail by a welding torch, deep nicks from anti-creepers and spike mauls, and from electrolytic corrosion at crossings and in tunnels, which results in the base of a rail being corroded 90 per cent of its thickness where it is in contact with the tie plates. The question of removal of rail because of base injuries is one where the factors of speed, density of traffic and variations in temperature are important.

The bases of rails are sensitive to stress raisers or to damage and are easily broken in service from impact. Nicks or other forms of damage act as stress raisers or nuclei for sudden ruptures. This is particularly true for those roads that operate in areas where the temperature drops below 30 deg. F., for at temperatures below this level the impact resistance or ductility of the steel is lowered. Individual rails probably have individual critical temperatures at which they become brittle, thus allowing a sudden rupture or failure to take place. If a nick or a gouge is present, failure can and does occur, resulting in sudden fracture.

In highway crossings and station platforms, where the rails are buried, and in tunnels, where they are in contact with the tie plates, corrosion sometimes reduces the thickness of the base to 90 per cent of its original thickness. These bases then become knife edges of irregular reduced section. This corrosion results in weakness and corresponding inability to resist impact shocks and the bases are subject to sudden rupture.

In the event replacements cannot be made immediately after the injury occurs, the injury should be protected adequately by fully-bolted joint bars as a temporary measure, and the rails should be removed immediately when replacement rails become available.

May Be Taken Literally

By C. B. Bronson
Inspecting Engineer, New York Central System, New York

In its application to the base of rail, the word injury may be taken literally to cover a wide range of conditions. It may include damage by unintentional spike-maul blows, by nicks with the cold chisel or other sharp tool, by nicks or bent rails caused by derailed equipment, by burning with the torch or the arc, by the thinning of the base by corrosion from brine action, by broken bases of the type generally known as half moons, where the rail base has rested on the shoulder of the tie plate, and by half-moon breaks which result from seams in the rail base.

When a half-moon break occurs there is no question as to the necessity for removing the rail, regardless of the cause of the break. Obviously, the rail section at the point of injury is weakened and its mechanical strength is reduced. Some have contended that protecting these broken areas with joint bars is sufficient to warrant retaining the damaged rail in service. This is bad practice, since other half-moon breaks can and do develop in the same rail, particularly those afflicted with seams in the base. One can prove the truth of this statement easily by using a spike maul to knock out additional half moons, because the base seams are not necessarily local, but may and do extend frequently for some distance along the length of the base.

If the damage is caused by a spike-maul blow, it is usually not severe enough to warrant removal of the rail. If there is a sharp nick, however, there is the possibility of a potential broken rail. Judgment alone can determine whether the damage is light or severe. Nicks from a cold chisel are somewhat in the same class. If sharp and deep, the removal of the rail should be considered. Sharp nicks are definitely stress raisers, and they are especially detrimental on the flange or base of the rail, which develops higher stresses under load than other parts of the rail section. Here again judgment and experience are necessary.

Sometimes rails are nicked, bent and galled by derailed wheels. If nicked or galled, the rails should come out, for these injuries are potential hazards. Where the rails are bent downward with practically no nicking or galling, they may be considered for continuation in service, although it is a rare occurrence to find a case of bending only. Usually one finds a downward bend at one or more points in the rail with nicked or galled spots at other places. There is little to be gained, therefore by leaving such rails in here and there, because it is likely that rails patched in adjacent to them will not match up for height, resulting in excessive end batter.

Burning the base of the rail when welding should not be permitted, but if this should occur accidentally and the burn is extensive enough to be equivalent to a nick, the rail should be removed. There is also a further hazard from the overheating that may occur at or adjacent to the damaged spot.

The thinning of the flanges as a result of brine corrosion is a considerable problem, which increases as the rail is retained in service longer than its normal period because replacement rail is not obtainable, as has been the case for several years. The point of excessive corrosion is usually on the outside flange, directly in front of the joint bar, in the direction of traffic.

Other points are adjacent to anti-creepers and on the outside flange. Usually, a slight check or crack in the edge of the flange provides the evidence that corrosion has advanced to or beyond the danger point.

Careful and constant inspection is required whenever a new crop of checked flanges makes its appearance. Oiling the rail and fastenings is of great assistance in preventing or retarding the initial thinning of the rail base, and in slowing down the rate of corrosion. Usually, rail in this condition is found in long stretches, and the remedy is to make a complete renewal as soon as ways and means permit. As a rule, such rails are fit for renewal when the reduction has reached to about one-half the normal base thickness, except for heavy-base rails where the reduction can generally be carried to a point where the flange thickness is about one-quarter of an inch, or even less, depending upon track and traffic conditions.

Most Satisfactory Type of Pump

What type of pump is most satisfactory for pumping from deep wells? Why? Does the depth of the well or the character of the water make any difference? The volume to be pumped?

Many Factors Involved

By J. H. Davidson
Water Engineer, Missouri-Kansas-Texas, Parsons, Kan.

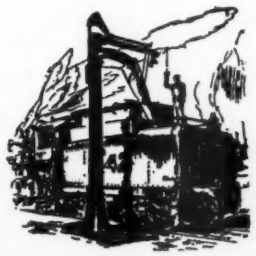
To select a deep-well pump that is most suitable for a given situation, it is necessary to consider many factors, such as location of the water, the power available, the volume of the supply, the character of the water, the depth of the well, the consumption, the pumping head, the length of its useful life, its reliability, its flexibility, its efficiency, and the cost of complete installation and of operation.

The three types of deep-well pumps in most common use are reciprocating pumps, turbine pumps and air lifts. Each has its respective advantages and disadvantages, for which reason a careful study should be made of all of the factors mentioned before deciding on the type to use for a given situation.

Where the yield of a well is relatively small and the depth does not exceed 300 to 400 ft., and the water does not carry sand or grit, the reciprocating pump may prove satisfactory. If the well yields a large volume and is over 200 ft. deep, a turbine pump will probably be the best type to use. Turbine pumps should not be used, however, in wells where the water carries much sand or grit, as this will cause excessive wear of the working parts and require frequent and costly repairs. Neither the reciprocating nor the deep-well turbine pump is suitable in a crooked well. However, the submersible turbine pump, in which the motor is placed in the well below the pump, thus avoiding the use of a shaft from the surface to the pump, can be used in a well that is not plumb.

The turbine type of deep-well pump is doubtless the most popular type in use on the railways today. It can handle large volumes of water and can be operated by several different kinds of power. The direct-connected vertical electric motor is the most popular unit. These pumps are either water-lubricated or oil-lubricated, another factor to be considered in selecting one.

While the air lift is the least efficient of these three types of deep-well pumps, it has some advantages that make its use desirable, or even necessary, in certain situations. For a given diameter of well it will produce the largest volume of water, and the depth from which it can pump is limited only by the limitations of the compressor. To operate at best efficiency, an air lift must be installed correctly, taking into consideration the volume of air and the pressure required; the ratio of the diameter of the air line to that of the discharge line; and whether the well casing should be used as a discharge line or whether a special discharge line should be installed. Since the air lift has no working parts in the well, it can be used in crooked wells and will operate in water carrying sand, which would quickly wear out the working parts of reciprocating pumps and deep-well turbines.



Of the three pumps under consideration, the air lift is probably the most reliable and will carry the lowest maintenance cost, but its efficiency is the lowest. The turbine is about as reliable as the reciprocating pump and, where selected carefully and installed correctly, its efficiency and maintenance cost compare favorably with the reciprocating pump. The latter will usually require more maintenance than the other two, owing to the wearing of valves, which must be renewed at regular intervals, but its efficiency is higher and it has more flexibility. All three types can be operated automatically and the attendance cost when operated manually is about the same.

Three Methods of Pumping

By Engineer of Water Service

There are three methods of pumping from deep wells, namely, with reciprocating pumps, with turbine centrifugal pumps and air lifts. Reciprocating, direct-acting, steam-head and power-operated well pumps have been used for many years, and many of them are still in use. They are more flexible than any other type at different heads and over a varying range of delivery. They also show the least variation in efficiency at different heads and deliveries. Their pumping capacity is somewhat limited, however, compared with the air lift or turbine pumps. Their use is also influenced somewhat as to depth of pump setting, since they are difficult to maintain when long rods are required.

The turbine pump is generally accepted as the most satisfactory all around equipment for pumping from wells. Types of this pump have been developed to meet almost all of the pumping conditions found in wells, and they are rapidly replacing other types, except where a very small rate of delivery is required. As with the reciprocating pump, their performance is somewhat limited with respect to the depth of the setting because of the length of the shaft. The submersible type of turbine well pump does not require a shaft reaching from the surface to the pump, however, as the motor is placed in the well below the pump, practically eliminating the shaft problem.

The air lift is the least efficient of all well-pumping methods. It has the advantage, however, that it is limited to depth of setting only by the limitations of the compressor. As it has no working parts it can be installed in crooked wells or wells out of plumb, where other types of pumps would

not give satisfactory service. An air lift is not affected by sand carried in the water.

Summing all of the factors involved, the turbine appears to be the most desirable under normal operating conditions. The reciprocating pump has a limited use because of its comparatively low capacity. Because of its low efficiency the air lift is desirable only under certain conditions for which other types are not suited.

Housing Track Laborers

What provision, other than the use of discarded box cars, can be made for housing section laborers? Extra gangs? Large permanent gangs? What are the advantages? The disadvantages? Can the same provision be made for bridges and building gangs? Why?

Prefers Building Houses

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Personally, I would prefer to build permanent houses rather than to use discarded box cars where no homes are available for section and other permanent gangs. In most parts of the country one can usually obtain better labor if the men are assured decent living conditions for themselves and their families. Furthermore, such a camp is usually more peaceful at night if the men have their families with them. Such camps are generally located in or near towns where the men are able, if they so desire, to find some diversion after hours. A camp of this sort should have lights, running water, baths, wash rooms, toilet facilities and possibly reading rooms.

This arrangement is not satisfactory for mobile gangs, however, since they may be assigned to any part of a region or a system upon short notice. Such gangs must be provided with camp cars to move their sleeping equipment, their personal belongings and their tools and machines to the points to which they are sent. The time is not far distant when the railways will be required to provide more in the way of accommodations and sanitation than they have done in the past, if they are going to attract and keep labor.

Does Not Favor Box Cars

By Roadmaster

I am not in favor of using discarded box cars for housing section or other permanent gangs. They are not only expensive if they are to be fitted up in such manner that men can be housed comfortably in them, but they never become anything except discarded box cars, no matter what is done to them. To begin with, they are deteriorated structures or they would not have been discarded; they contain many hiding places for mice and other vermin, from which it is difficult to rid them, or to keep them free of these pests, even after they may have been cleaned out thoroughly. Again, once the car bodies are set off the trucks and fitted up as living quarters, they are not moved easily, but are generally dismantled or burned when the need for them has passed, so that the whole cost of fitting them up is lost.

In the past, however, we have been dependent largely on these old car bodies for housing permanent and semi-permanent gangs, the alternative being to erect equally permanent structures of new materials, at a cost that could seldom be justified. Today, however, we have available prefabricated houses in a number of designs that can be made permanent, semi-permanent or completely portable as conditions demand. These buildings are so designed that they can be added to or reduced in size at only nominal cost. They can be erected quickly by semi-skilled or even by unskilled labor and can be dismantled with complete salvage—except, perhaps, the roofing—moved to a new site and re-erected in case it becomes necessary to move the gang to another point. If the gang is seasonal, these houses can be taken down and stored until needed again.

The prospect is that, in the immediate future, a considerable number of passenger-train cars will be retired in favor of newer equipment. Most of these old cars will be of steel construction and suitable for housing mobile gangs, such as bridge and building gangs, system or regional water service gangs and track gangs. Every effort should be made now to get these cars assigned to this service as they are retired. This should be done promptly before other disposition is arranged, for it is probable that no such opportunity will present itself again for many years.

Support for Circle Rails

What is the most satisfactory form of support for turntable circle rails? How should they be installed? What are the advantages?

Prefers Steel Plates

By C. H. Sandberg
Assistant Bridge Engineer, Atchison, Topeka & Santa Fe, Chicago

The most satisfactory method we have found for supporting the circle rail is to use 1½-in. by 12-in. by 1-ft. 3-in. steel bearing plates resting directly on a concrete foundation; the 15-in. length is placed longitudinally with the rail and a clear distance of 8 in. is provided between the plates. These bearing plates are held in position by two anchor bolts, each of which has a standard rail clip which holds the rail down and in position. Shims ⅛ in. and ¼ in. thick are provided and are placed under the bearing plates to take up any inequalities in elevation. These bearing plates are usually installed by placing the rail in position and drilling the anchor-bolt holes.

The usual difficulties encountered with the circle rail are keeping it level and to correct radius. This method of handling prevents the rail from getting out of line and surface. Additional shims can be placed as the turntable wheels wear or if any differences in elevation develop.

Not an Easy Problem

By Supervisor of Bbidges and Buildings

This question touches on a problem which has troubled many generations of bridge and building engineers, and has proved not to be as simple as it sounds. In fact, to the present time, a complete solution has not been found. In the first place, a circle rail should have an unyielding foundation; in the second place, it should be equally resistant to lateral forces. Since these lateral forces are applied at or near the top of the rail,

it is easy to understand why circle rails tend to get out of line, despite all efforts to hold them in place.

A heavy foundation of the densest concrete obtainable provides the best foundation that I know of for a rigid unyielding support, but there must be some means for protecting the concrete, just as ties in the track must be protected against rail cutting. For this purpose I have always employed heavy steel plates of such thickness that they do not cup or bend under the load, and of such plan area that the tendency to cut into the concrete is practically eliminated. These plates are anchored to hold them immobile and the rail is held down by means of rail clips. It is also desirable to use the heaviest rail section available for the circle rail to insure maximum resistance to lateral forces.

Does Traffic Shorten Tie Life?

To what extent does traffic shorten the life of ties? Does the character of the traffic or the speed of trains make any difference? In what ways?

No Statistics Available

By W. J. Burton
Assistant to Chief Engineer, Missouri Pacific, St. Louis, Mo.

These are general questions which cannot be answered, at least for the present, on the basis of exclusive statistics. For this reason, an answer may be attempted only through the process of logical thinking. It was in the hope of providing the data necessary to permit the inclusion of traffic density as a factor in tie-life studies that the tie committee of the American Railway Engineering Association arranged to have the annual reports to the Interstate Commerce Commission include ton-mile figures of traffic. The first such figures are for 1929, and the data for 15 years are now available. But this period is too short for a long lived item like creosoted crossties, particularly when normal renewals have been greatly affected by certain changing conditions other than the volume of traffic. For example, rail life, measured in traffic units, has been increased measurably by the application of better and heavier rail, by the building up of rail ends without removal from the track, and by other means. The resulting less frequent rail renewals (per traffic volume unit) have reacted to reduce the tie damage that unavoidably accompanies rail renewals.

Again, during the years since 1929, there has been a marked improvement in the quality of the ties themselves, and in the protection afforded them against damage from traffic. Even in the matter of preservative treatment there has been constant improvement, both in the percentage of treated ties to the total number of ties used and in the quality of the ties themselves and their treatment. In fact, in large part the efforts of maintenance engineers and their various committees are being directed toward extending the life of the various parts of the track and structures of the railways. For these reasons, the effects of traffic density on crosstie life are masked in tie-life statistics by these improvements.

It is reasonable to believe that, with an untreated tie good for, say, eight years, a year of light traffic is substantially as bad for the tie as a year of heavy traffic. The organisms producing decay do not slow up because traffic is light and, in the short space of eight years, usually not more than one rail renewal is to be expected on any given tie. On the other hand, for well-treated ties, the decay life of which is several decades or scores of years, the mere lapse of time is relatively unimportant. In many places, such ties normally are subjected to two, three or even more rail renewals. Such ties are better able to withstand exposure to time (as well as being more resistant to traffic) than the untreated ones, so it must follow that with them the important life-determining factor is traffic rather than the mere lapse of time. This is true even though the fact is neglected that a greater number of rail renewals is to be expected during the life of these treated ties.

There is no way of showing just how much tie life is shortened each time the rail is renewed, but this loss must be appreciable because of the frequency with which ties need renewal as a result of damage around the rail seat, much of which is connected with the driving of spikes. Perhaps a fair guess is five years. As rail renewals are made necessary largely because of damage from traffic, rather than because of the lapse of time, it follows that ties are likewise affected by the volume of traffic.

If fast trains are more damaging to rail than equal tonnages of slow ones, the effect must be reflected in increased tie renewals. However, here again, the discussion must be mostly theoretical, because it is likely that high-speed lightweight trains are not necessarily as damaging as slower but heavier trains.

Speed Adds Load

By Chief Tie Inspector

The maximum locomotive wheel load in common use on the road upon which I am employed is approximately 38,000 lb. or 76,000 lb. per axle. Using 100-lb. rail and 6-in. by 8-in. by 8-ft. ties, spaced 20 in. on centers, field tests have shown that only about 45 per cent of this static load is transferred directly to each tie when the wheel is directly over it. However, as the speed increases, the actual load on the tie, including dynamic augment and impact, increases from one and one-half to two times on tangents, but is always less than the original static wheel load of 38,000 lb. On curves, where traffic ordinarily moves at varying speeds, both above and below that for which the elevation was calculated, the maximum load on the tie may be as much as 40 per cent more than on tangent. It is evident from the foregoing that dense heavy traffic and high speeds impose more severe damage on crossties, since they must absorb more and harder blows from passing wheel loads. Approximately 50 per cent of all ties fail eventually as a result of mechanical damage and, if it were possible for all other items to remain constant, it is reasonable to assume that the average service life of crossties would be in direct proportion to the kind and volume of traffic and the speed of trains.

Many Other Forces Acting

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

There are many forces aside from traffic and speed that, either singly or in combination, tend to shorten the service life of ties. In fact, it has been said with more than a grain of truth, that ties are most-abused material entering into railway construc-

tion. Lack of drainage causes foul and sloppy ballast, which keeps the tie wet and thus creates a condition highly detrimental to long service life.

No tie should be inserted without the protection of tie plates. Although the application of tie plates is almost universal now, many of the ties still in the track were not so equipped originally and this has been responsible for shortened life. Again, it is only within recent years that tie plates have been made large enough to give adequate protection. A tie plate that is too small in area has a detrimental effect on tie life.

During the war years, to get ties at all, in many instances the railways were forced to accept inferior woods. Although the ties accepted may have been sound and of full dimensions, it is a foregone conclusion that, even though they may be given the best of care, some of these ties will have a shorter life than if they had been made from better woods. Furthermore, because of a marked shortage of ties during these years, in numerous instances ties were shipped directly from the treating cylinders and used almost immediately after treatment. I am convinced that such ties do not last as long as they would if they were allowed to season for a reasonable time before insertion.

In addition to the factors that have been mentioned, the manner in which the track is maintained, that is, the tamping when surfacing, the adzing for new rail, the gaging, the line and surface maintained, the condition of the joints, and numerous other items, all have their effect on the length of service that will be obtained from ties.

It will be seen from the foregoing that there are many factors other than the volume and speed of traffic that affect the life of ties, and that while some of them may be incidental to the movement of traffic, or may fluctuate roughly with it as it increases and decreases, others are entirely independent of both volume and speed. So far as I know, no one has ever attempted to segregate these factors or to determine what part of the total effect each one has. Roughly, however, it is safe to say that, other conditions being equal, the greater the volume of traffic the shorter the life of the ties; and that a measurable increase in the speed with which this same traffic moves will have the same effect.

Plastics in Building Work

To what extent can plastics be used in the construction and modernization of railway buildings? For what purposes? What are the advantages?

A Multitude of Plastics

By G. S. Crites
Divsion Engineer, Baltimore & Ohio, Baltimore, Md.

Glass was the first of the plastics to be used in railway buildings, and has continued to be one of the essential building materials until today. There is no reason why some other plastic or plastics should not replace glass if found to be more economical, more suitable or more pleasing. It is possible that certain of the newer plastics may also be found to be economical for conduits and fixtures of various kinds.

There are certain plastics that are excellent conductors of heat, and these can be laid over other materials that absorb heat readily to make economical coverings for tables, counters and other surfaces that are usually subject to cigarette burns or other heat injuries.

Tile is probably the oldest plastic used in building construction, but some of the modern plastics are equally, if not more, suitable than tile for floors, walls, counter panels and counter tops. This is also true for interior glazed brick work.

Since there are roundly more than a thousand known plastics and since more are being developed constantly, while some of those already in use are being modified, it seems quite probable that a plastic can be found for almost any purpose in the construction and remodeling of railway buildings, but the selection of the plastic most suitable for the purpose desired must be done carefully.

It has been predicted that we are just entering a plastic age, contrasted with the stone age, the iron age, etc., but for the present at least the selection of the plastics most suitable for specific purposes must be left to those who are acquainted with these products and familiar with their characteristics. Owing to the marked reduction in building activities which characterized the depression and the ensuing war period, railway building engineers have had little opportunity to gain this knowledge.

As an example of how important it is to be familiar with the characteristics of the materials one uses, if a celluloid top were applied to a counter, the first person who laid a lighted cigarette on it would likely cause it to go up in a flash and disappear. On the other hand, plastics are available that will neither burn nor scar under the effect of innumerable lighted cigarettes.

They Are Cleaned Easily

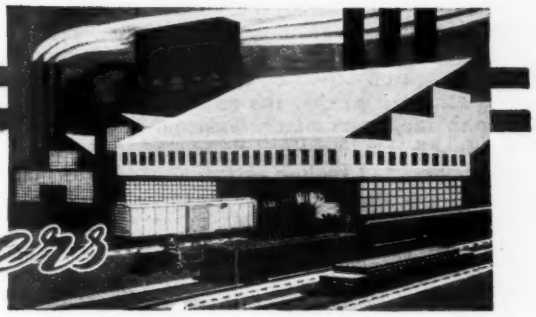
By L. C. Winkelhaus
Architectural Engineer, Chicago & North Western, Chicago

Plastics are available in a wide variety of colors, some of which are opaque while others are transparent; and they range from a high density that is practically mar proof to the softer textures of the thermoplastics. Among the great number that have been developed are many that are appropriate for producing new effects in both the construction of buildings and the modernization of those already in service. While some of these plastics can be employed in almost any type of building where finished surfaces are desired, their largest application will be found, at present at least, in passenger stations, in city ticket offices and in office buildings. As an example, some of the harder varieties, which can be obtained in a wide range of colors and patterns, with or without inlays, are especially suitable for ticket-counter tops.

Crystal-clear sheets are also available in thicknesses from 1/6 to ¼ in., which can be bent to almost any shape by careful heating. This material is ideal for partially enclosing open-type ticket counters. These sheets may be tinted or have perforated patterns. They also make desirable covers for bulletin boards, as they can be attached to walls without the customary frame or border. Similar material in the form of rods can be employed for door pulls, for counter fronts, for window guards and for a variety of similar purposes.

Most plastics can be worked easily with tools, that is, they can be sawed, filed, drilled, threaded and tapped with ordinary tools, and they can be sanded and polished. Some of them can also be welded by a simple operation that does not require expert skill. In general, it is a simple matter to keep plastic surfaces clean. Many of the plastics suitable for building purposes are stronger than wood, and their resistance to impact greatly exceeds that of glass. All of these characteristics combine to make them desirable materials for use in passenger stations.

PRODUCTS of Manufacturers

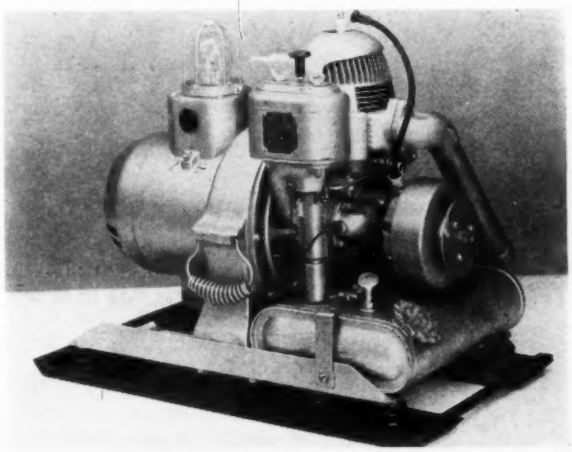


Homelite Generators

THE Homelite Corporation, Port Chester, N.Y., has developed two new portable, gasoline-engine-driven generators, Model 21A and 21D, which are claimed to be especially suited for supplying emergency power for the operation of electric tools, lights and similar items, or where power lines are inaccessible. The Model 21A generator is an 1800-watt, 115-volt a.c. unit weighing 115 lb., while the Model 21D is a 2,000-watt, 120-volt d.c. generator weighing 105 lb. Both units are 24⅜ in. long, 17⅛ in. wide and 21⅛ in. high.

Both generators incorporate new design features which were developed for the armed services, these including the use of aluminum alloys for all large castings, permitting an increase in output without sacrificing portability. In addition, each model has a single-cylinder, air-cooled, two-cycle engine, which has a rotary disc-type valve that is self-seating and requires no adjustment.

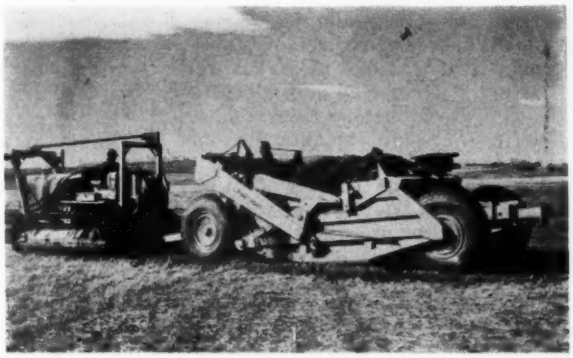
Other features include an improved Wico magneto, which gives a strong spark for quick starting; an automatic built-in governor, which controls the engine speed; and a pressure-vapor oil system, which sprays a film of fresh oil over all moving parts with each revolution. The generator is direct-connected to the engine, with the armature mounted on the engine crankshaft. Both units are said to be of sturdy construction and dependable in operation.



The Model 21D Homelite Generator Is a 2000-Watt Machine

LaPlant-Choate Cable Scraper

THE LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa, has developed a new 8½-cu. yd. cable scraper, known as Model C-108, which is said to incorporate all the advantages of its former scraper models as well as the improvements made in its scrapers built for the armed forces.



LaPlant-Choate Cable Scraper, Model C-108

One of the new features, which is claimed to add substantially to the performance of the scraper, is a floating apron which opens 30 in. before the rear gate moves, permitting adjustment of the apron to any position before loading. Furthermore, the apron clears the load completely as the rear gate starts to move forward, thus preventing any compaction of the load between apron and gate. The open top bowl is free of overhead obstruction, permitting the unit to be loaded by shovel, dragline or elevating grader, and the high lift of the apron enables the scraper to discharge any type of material from the bowl, including rocks or sticky gumbo.

The unit is a front-dump, forced-ejection-type of scraper, and it is designed to facilitate spreading, which is possible within a range of ½ in. to 18 in. Dumping is said to be easier, and much less tractor horsepower is said to be utilized for dumping and spreading because of a new arrangement of the sheave mechanism and design of the linkage. In addition, the interior of the scraper is free of obstruction to loading and dumping.

The bowl can be raised and lowered quickly on account of the cam action on the bowl lift cable, which is said to be particularly advantageous when loading sand, gravel or other loose material.

A 14-in. ground clearance of the bowl is included among the hauling

features of the new scraper. Less braking power is required at the power control unit to carry the load because the cam action on the bowl lift is arranged so that the cable is closer to the center of the axle on the sheave in hauling.

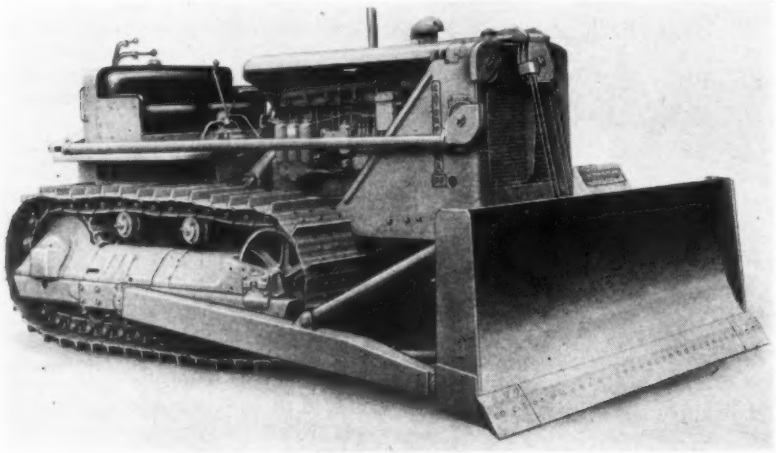
In digging and loading operations the rear wheels of the scraper are inside the cut at all times, and, because of the low center of gravity of the unit, it is claimed that effective side slope work is possible.

The new scraper weighs 14,500 lb., is 27 ft. 3 in. long, 10 ft. 5 in. wide, and 7 ft. 8 in. high. Other structural features include deep box plate sections; welded construction; special steel, resulting in lighter weight, yet retaining maximum strength; reversible cutting edge; tapered roller bearings for wheels; and a choice of three tire sizes.

Cable-Controlled Bulldozers and Scrapers

THE Caterpillar Tractor Company, Peoria, Ill., has announced the production of Caterpillar cable-controlled bulldozers and scrapers as a result of the lifting of WPB restrictions. Developed and added to the company's line of products more than a year ago, manufacture of these items marks Caterpillar's entry into the field of this type of equipment. The bulldozers and scrapers are designed for use with the various models of Caterpillar tractors.

Among the advantages claimed for the bulldozers are: balanced design, large capacity, rigid construction, elimination of "A" frame, reinforced blade, enclosed operating cables, long-life cutting edges, easy blade adjustments, quick mounting, correctly grooved sheaves, long cable life, safe operation, wide visibility, high lift, low drop, straight or angling cut, and unit manufacture.



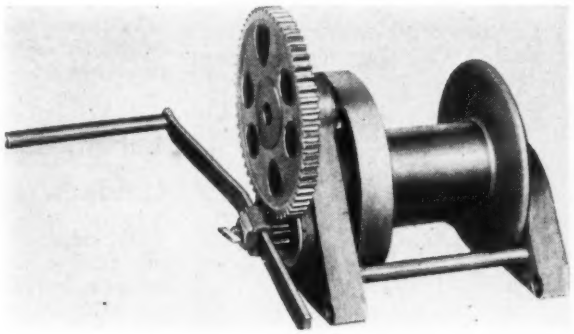
View of a Caterpillar Cable-Controlled Bulldozer Mounted on a Caterpillar Track-Type Diesel D-8 Tractor

All-Steel Handiwinch

THE American Hoist and Derrick Company, Saint Paul, Minn., has developed an all-steel hand power winch, Model 104, which has a capacity of five tons. The unit consists of a drum mounted between two side frames rigidly held together by two threaded, shouldered tie bolts, and a stationary drum shaft which is welded to one side frame and pinned to the other. The drum can be driven either through 27:1 double-reduction gears for heavy loads, or 4.5:1 single-reduction gears for light loads.

The pinion meshing with the internal gear on the drum can be disengaged by sliding the unit consisting of pinion and intermediate gear, to facilitate pulling a rope off the drum by hand. All gears are held in place by one latch, which is said to make the shifting or removal of gears easy. The winch is equipped with a removable crank, which is adjustable for any length from 10 to 20 in., and which can be applied for either reduction by inserting in the proper socket.

A band brake is furnished which engages the drum when it is mounted on the high-speed pinion shaft that has a gear ratio of 27:1 to the drum, an arrangement which is said to permit safe handling of heavy loads without creep. A ratchet, which forms an integral part of the brake drum, is engaged by a pawl for the safe holding of loads. It is kept in engagement by a spring and in the out position by means of a small lever.

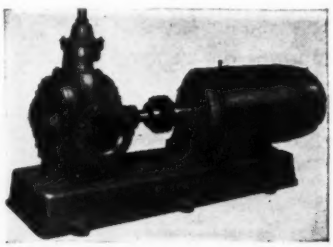


The New American Handiwinch

Except for the drum bushings, the winch throughout is equipped with self-lubricating bronze bushings. Oil holes are provided for the drum bearings. The winch weighs 17½ lb., and is 16½ in. long, 15½ in. wide and 16¾ in. high.

Blackmer Fuel-Oil Pump

A NEW rotary pumping unit for handling bunker "C" fuel oil and other liquids of similar characteristics has been developed by the Blackmer Pump Company, Grand Rapids, Mich. The pump is bronze-fitted and operates on the bucket design (swinging-vane) principle. Because of this construction, the pump is said to be self-adjusting for wear.



The New Blackmer Fuel-Oil Pump

When the buckets are worn to the critical point, they can be replaced by removing the head of the pump, pulling out the worn buckets and inserting new ones. No adjustments or

"wearing in" are necessary, it is claimed. The replacement of the worn buckets restores the pump to normal capacity.

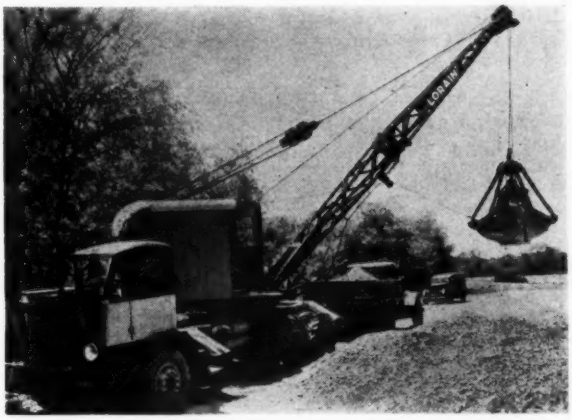
The power unit is a 50-hp. gear-head motor with a speed of 150 r.p.m at the drive shaft, which is connected to the pump by a flexible coupling. The pump has a capacity of 500 gal. per min. and operates at a pressure of 125 lb. per sq. in.

Non-Skid Floor Coating

THE Stonhard Company, Philadelphia, Pa., has recently developed a semi-plastic non-skid coating for wood, cement or metal floors that are subject to trucking or other heavy abuse. The material has a semi-plastic consistency and is applied as a coating 1/32 in. to 1/16 in. thick with a trowel or brush. It sets in 24 hrs. to provide a non-skid surface with a smooth finish that will not accumulate dirt and dust, making the floors sanitary and easy to clean. The coating is available in five different colors, making attractive floor color schemes possible. Before it is applied, any cracks, breaks, ruts or holes should first be patched or resurfaced.

Thew Shovel and Crane

THE Thew Shovel Company, Lorain, Ohio, has added two new units to its line of mobile cranes and shovels, one of these being a chain-drive crawler shovel and the other a rubber-tired, four-wheel drive Moto-Crane. Both machines were developed from wartime engineering experience, are designed for heavy-duty service, and are said to be equally adapted to crane, shovel, clamshell and dragline work.



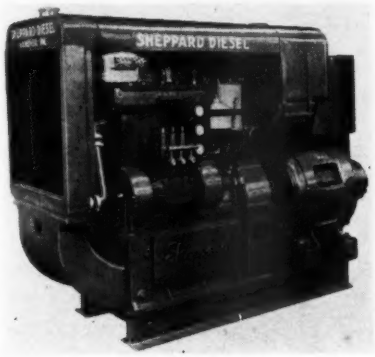
The Four-Wheel Drive Moto-Crane

Features of the crawler shovel include a standard tread width of 30 in., and two travel speeds in either direction of 3/4 and 1 5/8 m.p.h. Steering is done from the cab with the boom in any swing position. The tread and travel lock is of the four-way ratchet and pawl type.

The Moto-Crane has a 20-ton capacity and a specially designed six-wheel, rubber-tired under carriage for shovel and crane loads. It has ten speeds forward and two in reverse, permitting travel up to 28 m.p.h. Travel power is supplied through two worm driven axles to four dual tire rear wheels, equipped with air brakes.

Automatic Starters For Diesel-Driven Generators

THE R. H. Sheppard Company, Hanover, Pa., has recently developed an automatic load control for its Diesel-powered generating sets, which is designed to save power costs by reducing fuel consumption, and to prolong the life of the equipment by cutting the operating time of the power plants to periods of actual power demand. With the new control, the load demand on the power circuit controls the starting and stopping of the power source; thus, whenever a switch on an electrical circuit supplied by the Diesel-powered generating set is turned on or off, the load control automatically starts or stops the power plant. The load-control is connected to existing service leads and does not require any special wiring. It is available for single or three-phase generators, and is installed exclusively on Sheppard Diesel generating sets.



The Sheppard, Model 6A, Generating Set Equipped With Load-Control

Improved Paving Breaker

THE Syntron Company, Homer City, Pa., has announced an improvement in the design of the tool-retaining arrangement of its self-contained, portable gasoline hammer paving breaker. The nose-end arrangement has been redesigned to utilize the resiliency of a spring-tool retaining clip, which eliminates the solid latch mechanism previously employed. Three advantages are claimed in the use of the spring clip. These include the provision of easy spring action of the tool itself when used at maximum overtravel, the provision of a quicker and easier method of changing tools used in the hammer, and the elimination of broken retainer latches, nose castings, etc., because of a lack of resiliency in the retaining arrangement.

The Improved Paving Breaker Showing the Spring-Tool Retaining Clip

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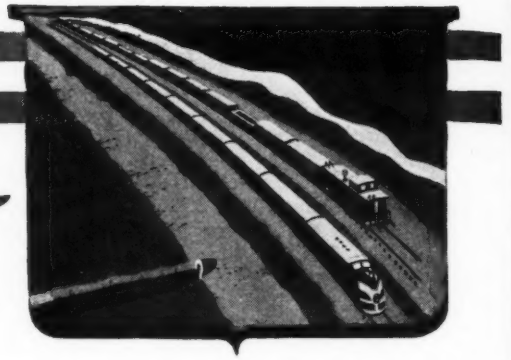
VICTORY TRAINS—As part of the present Victory loan campaign, four trains, loaded with war exhibits, will be moved in December over 21 western railroads to approximately 100 mid-western and western cities in 16 states. The four units will also carry numerous exhibits of captured trophies. Through plans perfected by the 21 western railroads in co-operation with the U. S. Treasury, War and Navy departments, the exhibitions will be in charge of veterans.

NEWS of the Month



Eight Months' R. R. Income

Total operating revenues of United States Class I railroads for the first eight months of 1945 were $6,251,217,314, compared with $6,281,293,192 during the same period of 1944. Taxes amounted to $1,112,648,033 in 1945, slightly under last year's figure of $1,254,694,612. Net railway operating income, after taxes and operating expenses, but before interest and other charges, was $722,678,154 in 1945, against $753,656,408 in 1944.

I. C. Maintenance Men Work Month Without Injury

Employees in the maintenance of way and structures department of the Illinois Central, during the entire month of September, worked 2,000,000 man-hours without a single reportable injury or motor car accident. According to C. H. Mottier, chief engineer of the road, there were only 23 motor car accidents and 46 personal injuries in the department in the first nine months of the year, during which time 17,500,000 man-hours were worked, producing a casualty rate of 2.61 per million man-hours. This compares with a rate of 4.23 for the same period in 1944 and 5.82 for 1943.

O.D.T. Estimates 35 Million Ties in 1945

Railway crosstie production in 1945 is expected to reach only about 35,000,000 ties, according to a recent statement prepared by the Division of Materials and Equipment of the Office of Defense Transportation. This compares with estimated requirements for the year of 64,000,000 ties. For 1946, the report estimates a production of about 45,000,000 crossties, a total which is expected to rise to nearly 50,000,000 in 1947.

Discussing the decline in tie production in the face of rising demands, the O.D.T. statement calls loss of man-power to the armed forces and to war industries, and sharply increased costs of production, the major factors causing the drop. It goes on to point out that the price increase authorized last July, plus the return to normal occupations of much labor that has been diverted to war-time occupations, are expected to cause the increases in tie production forecast for the next two years.

The report reveals that the estimated 1945 installations of 35,000,000 ties will be at a rate of 15.529 per million gross ton-miles (freight and passenger) as compared with a rate of 34.588 in 1935, and 28.263 in 1941, the last full year of peacetime operation. Using the 1935-1939 average as normal, the 1945 rate is estimated to be only 44.35 per cent of normal requirements.

Honor Santa Fe Bridge Draftsman

Technical Sergeant C. H. Brinkerhoff, furloughed bridge draftsman from the engineering department of the Atchison, Topeka & Santa Fe, at Chicago, has been awarded the Bronze Star, according to a letter written Santa Fe President F. G. Gurley by Colonel W. P. Wilson, deputy director of military railway service in Italy. According to Col. Wilson, Sgt. Brinkerhoff was responsible for the designing, drafting, inspection and maintenance of all railway bridges in Italy under the jurisdiction of the 774th Railway Grand Division.

Narrow Gage "Show" Marks Rio Grande 75th Birthday

As part of the celebration of its 75th anniversary, the Denver & Rio Grande Western during the week of October 22 displayed a special train of standard flat cars loaded with early-day narrow-gage equipment, which visited many important points on the line. The special, with 13 cars, left Denver, Colo., on October 22 and carried a group of Rio Grande officers and a large cast of entertainers banded together under the name of the "Gay Nineties Revue."

At each stopping place a show was given from a "stage car" included in the train. In return, a number of communities at which the train stopped staged additional events in keeping with the anniversary celebration. Included in the narrow-gage equipment displayed were a locomotive built in 1882, weighing 59,330 lb., an early day coach, box car and caboose.

Record Troop Movement Forecast for This Month

December is expected to be the peak month in the return of Army personnel to this country, according to a recent statement by Maj. Gen. Charles P. Gross, chief of transportation, who revealed that during this month approximately 730,000 men are expected to land, 306,000 at Pacific coast ports and 423,000 at East coast ports.

Although exact figures were not available at press time, the War Department estimated November troop movements at 1,130,000 men, of whom 697,000 were handled from the ports. December figures are expected to be slightly larger.

According to the statement, the return of service personnel to this country has reached such volume that the services are requesting sleeping cars for movements of 48-hr. duration or over only, requiring other trips to be made by day coach. Labor troubles at many manufacturing plants are given as one of the primary causes of the difficulty, since 300 troop sleepers of an order for 1,200 are completed, except for berths, and consequently cannot yet be used.

At present the Office of Defense Transportation is making studies looking toward the withdrawal of more sleeping cars from civilian traffic. In the meantime, the air lines operating from the West coast have been ordered by the O.D.T. to allot 70 per cent of their passenger space to army and navy personnel returning from the Pacific and destined to points on the Eastern seaboard.

1250 Passenger Cars Ordered: Roads Plan Many New Services

There are now 1244 new passenger train cars on order, with additional large orders expected shortly, according to an article in the annual "Passenger Progress" issue of Railway Age. In addition large numbers of steam and Diesel locomotives are on order.

That the new cars are to be used in equipping new passenger trains in all parts of the country is indicated by the following partial list of new cars ordered:

Alton, 15; Atchison, Topeka & Santa Fe, 161; Atlantic Coast Line, 21; Baltimore & Ohio, 8; Boston & Maine—Maine Central, 24; Central of Georgia, 14; Chesapeake & Ohio, 30; Chicago & Eastern Illinois, 11; Chicago & North Western, 20; Chicago, Burlington & Quincy, 56; Chicago, Rock Island & Pacific, 53; Denver & Rio Grande Western, 13; Florida East Coast, 20; Great Northern, 48; Illinois Terminal, 8 multiple-unit electric cars, built in four 2-car units; Long Island, 10 double-deck commuter cars; Louisville & Nashville, 28; Minneapolis & St. Louis, 6; Missouri-Kansas-Texas, 14; Missouri Pacific, 72; New York Central, 300 (this road was also reported on November 17 as inquiring for 214 additional cars to equip 14 passenger trains); Northern Pacific, 36; Pennsylvania, 112; Pere Marquette, 14; Richmond, Fredericksburg & Potomac, 19; St. Louis-San Francisco, 24; Seaboard, 30; Texas & Pacific, 46; Wabash, 7; and Western Pacific, 22 cars.

Changes in Railway Personnel

General

J. P. Allison, assistant superintendent of the Marion division of the **Erie,** at Chicago, and an engineer by training and experience, has been promoted to superintendent of the Marion division, with headquarters at Huntington, Ind.

J. W. Pfau, chief engineer of the New York Central, Lines Buffalo and East, has been promoted to the newly-created position of assistant to vice-president, improvements and development, with headquarters as before at New York. **Frank J. Jerome,** chief engineer of the New York Central, Lines West of Buffalo, with headquarters at Chicago, has been advanced to assistant to executive vice-president, at New York, succeeding **George A. Noren,** whose appointment as chief engineer, Lines Buffalo and East, relieving Mr. Pfau, is reported elsewhere in these columns. **Neil D. Hyde,** assistant to the vice-president at Chicago, has had his jurisdiction extended to include operating as well as engineering matters. A photograph of Mr. Hyde and a sketch of his career were published in the August issue of *Railway Engineering and Maintenance.*

Mr. Pfau was born on September 18, 1876, at Troy, N.Y., and was educated at Rensselaer Polytechnic Institute at Troy, from which he was graduated in 1899. In the same year he entered railway service as a chainman on the New York Central & Hudson River (now the New York Central), and after serving in various

J. W. Pfau

capacities in the engineering department he left this company in 1904 to enter the service of the State of New York as a masonry expert. Two years later he re-entered the engineering dpartment of the New York Central as a resident engineer at New York, which position he held until 1908, when he was made engineer of grade crossing elimination, with the same headquarters. From 1910 to 1927 he held the position of engineer of construction, and in the latter year he was promoted to assistant chief engineer, which position he held until June, 1933, when he was appointed acting chief engineer of the Lines Buffalo and East at New York. Three months later he was appointed chief engineer of the Lines Buffalo and East, which position he held until his recent promotion.

Mr. Jerome was born at Painesville, Ohio, on May 26, 1890, and was graduated from Williams College in 1911, and from Massachusetts Institute of Technology in 1914. He entered railway service with

Frank J. Jerome

the New York Central on July 6, 1914, as a transitman at Elyria, Ohio, and in March of the following year he was transferred to Toledo, Ohio. In 1917 he was appointed assistant engineer at Chicago, and on August 20, 1923, he was promoted to trainmaster at that point. Mr. Jerome was appointed division engineer, with headquarters at Chicago, on November 1, 1927, and in April, 1938, he was promoted to engineer maintenance of way of the Michigan Central, with headquarters at Detroit, Mich. On October 1, 1939, he was advanced to assistant chief engineer of the New York Central system (including the Michigan Central), with headquarters at Chicago. One year later his jurisdiction was extended to include the Big Four and the Peoria & Eastern (also controlled by the N.Y.C.). In April, 1943, he was promoted to chief engineer, the position he held at the time of his new appointment.

Thomas E. Boyle, whose promotion to superintendent of the Indianapolis division of the Pennsylvania was reported in the November issue, was born at Crawfordsville, Ind., on June 5, 1907, and received his higher education at Notre Dame University. He entered railway service in July, 1928, as an assistant on the engineering corps of the Pennsylvania at Toledo, Ohio, serving in various other capacities at different points on the road until 1936, when he was promoted to supervisor of track on the Pennsylvania-Reading Seashore Lines. Two years later Mr. Boyle was transferred to the Philadelphia Terminal division, with headquarters at Philadelphia, and in 1940 he was advanced to assistant division engineer of the Ft. Wayne division. In 1941 he was promoted to division engineer of the Conemaugh division, and in 1943 he was transferred to the Philadelphia Terminal division, remaining in that location until his new appointment.

Engineering

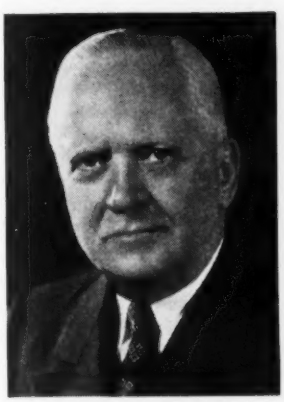
D. A. Steel has been appointed assistant to chief engineer of the Baltimore & Ohio, at Baltimore, Md.

L. J. Riegler, assistant engineer on the Central region of the Pennsylvania, at Pittsburgh, Pa., has retired.

J. S. Parsons, having returned from furlough at the close of the war, has been appointed division engineer on the **Erie,** at Marion, Ohio, succeeding **R. H. Jordan,** who has been named assistant division engineer at Hornell, N.Y. Mr. Jordan replaces **P. J. Seidel,** whose appointment as track supervisor at Hornell is reported elsewhere in these columns.

D. J. Evans, maintenance assistant on the Baltimore & Ohio Chicago Terminal, at Chicago, has been promoted to division engineer, with the same headquarters, a newly created position. **E. S. Joehnk,** assistant engineer of bridges, has been appointed assistant engineer of maintenance and construction, also at Chicago, a change of title.

R. J. Middleton, assistant chief engineer of the Chicago, Milwaukee, St. Paul & Pacific, has been promoted to chief engineer, succeeding **William H. Penfield,** who has retired. Mr. Penfield was born at Foxburg, Pa., on January 12, 1874, and entered railroad service in January, 1894, in the engineering department of the



William H. Penfield

Buffalo, Rochester & Pittsburgh (now part of the Baltimore & Ohio). From August, 1899, to March, 1903, he was construction and location engineer on the Milwaukee, and from March, 1903, to December, 1905, he served as locating engineer with the Western Pacific. Since 1905 he has served continuously with the Milwaukee. In December, 1905, he became construction engineer, and six years later he was advanced to assistant chief engineer. In February, 1913, Mr. Penfield was promoted to engineer maintenance

of way and served in this capacity until May, 1935, when he was further advanced to the position he held at the time of his retirement.

O. T. Carroll has been appointed assistant engineer of the Peoria & Pekin Union, with headquarters at Peoria, Ill., succeeding **R. E. Copper,** whose promotion to acting chief engineer was reported in the May issue.

Herbert G. Dennis, who has been serving overseas as a Lt. Col. on the staff of Major General Carl R. Gray, Jr., in the headquarters of the 1st Military Railway Service as officer in charge of reconstruction of railroads in Africa, Italy, France and Germany, and who formerly was district bridge engineer on the Chicago, Rock Island & Pacific, at El Reno, Okla., has been appointed division engineer at Des Moines, Ia., succeeding **J. B. Whiting,** who has been assigned to other duties.

Chauncey C. Robnett, whose promotion to hydraulic engineer of the Chicago, Burlington & Quincy System was reported in the November issue, was born at Centralia, Ill., on June 22, 1889, and entered

Chauncey C. Robnett

railway service in 1910 as a rodman on the Burlington. From 1910 until 1918 he served as rodman and instrumentman at various points on the Illinois and Missouri districts, being promoted to assistant division engineer at St. Joseph, Mo., in the latter year. In 1938 he was further advanced to division engineer at Hannibal, Mo., and in 1942 he was transferred in the same capacity to St. Joseph, remaining in that position until his recent promotion.

Hubert Wuerth, whose retirement as division engineer of the Dubuque and Illinois division of the Chicago, Milwaukee, St. Paul & Pacific, at Savanna, Ill., was reported in the November issue, was born at Sauk City, Wis., on October 12, 1884, and was graduated from the University of Wisconsin in 1909. Mr. Wuerth entered railway service as a rodman on the C.M.&St.P. (now C.M.St.P.&P.), at Milwaukee, Wis., in September, 1909, subsequently serving as an instrumentman at that point. In April, 1914, he was advanced to resident engineer on a track elevation project at Milwaukee, and in August, 1916, he was further advanced to assistant engineer, masonry, at Chicago. He subsequently served as assistant engineer, general maintenance, at that point, until December, 1926, when he was promoted to division engineer of the Chicago Terminal division. He was transferred to Mason City, Iowa, in 1933, and to Marion, Iowa, in 1935. In November, 1942, Mr. Wuerth came to Savanna as division engineer, remaining in that capacity until his recent retirement.

William J. Jones, whose promotion to senior assistant division engineer on the Southern Pacific, at El Paso, Tex., was reported in the November issue, was born at San Antonio, Tex., on October 8, 1914, and was graduated with the degree of mining engineer from the Texas College of Mines in 1935. He entered railway service in 1936 as a rodman on the Southern Pacific, becoming subsequently draftsman, instrumentman, head cost analyst and second assistant engineer, until September, 1943, when he became general track foreman on the Sacramento division, at Sacramento, Cal. One year later he was promoted to second assistant division engineer of the San Joaquin division, at Bakersfield, Cal., holding this position until his recent promotion.

George A. Noren, engineering assistant to executive vice-president of the New York Central System, with headquarters at New York, has been appointed chief engineer, New York Central, Lines Buffalo and East, with the same headquarters, succeeding **J. W. Pfau,** whose appointment as assistant to vice-president, improvements and development, at New York, is reported elsewhere in these columns. **Edward A. Dougherty,** assistant general manager of the New York Central, Lines West of Buffalo, with headquarters at Cleveland, Ohio, has been promoted to chief engineer, New York Central System, Lines West of Buffalo, including the Indiana Harbor Belt, Chicago Junction Railway and Chicago River and Indiana, with headquarters at Chicago, succeeding **Frank J. Jerome,** whose promotion to assistant to executive vice-president, at New York, is reported elsewhere in these columns.

Track

A. Pomerleau, roadmaster on the Canadian Pacific, at Vallee Jct., Que., has retired.

W. B. Hoffman, asistant supervisor of track on the Pittsburgh division of the Pennsylvania, has been transferred to the Middle division.

H. V. Meek has been appointed acting roadmaster on the Denver & Rio Grande Western, at Helper, Utah, replacing **R. A. Fox,** who has been assigned to other duties.

C. E. Thornley, foreman of a system rail gang on the Alton, has been promoted to acting supervisor of track, at Joliet, Ill., succeeding **H. E. Silvernail,** who has been granted a leave of absence because of ill health.

F. Charles, returning from a four years' leave of absence to serve in the United States armed forces, has been appointed assistant roadmaster on the Chicago, Rock Island & Pacific, on new line construction at Centerville, Ia. **Noble Hurt,** acting roadmaster at Topeka, Kan., has been promoted to roadmaster at Atlantic, Ia., succeeding **A. Mills,** assigned to other duties.

H. D. Sipe, who has returned from military service, has been appointed assistant supervisor of track on the Maryland division of the Pennsylvania.

P. J. Seidel, assistant division engineer on the Erie at Hornell, N.Y., has been appointed track supervisor at that point, succeeding **Fred Fisk,** who retired from active service on October 1.

W. J. Ott, assistant supervisor of track on the Eastern division of the Pennsylvania, has been transferred to the Pittsburgh division, and **B. E. Fetters,** general foreman on the Panhandle division, has been promoted to assistant supervisor of track on the Eastern division, succeeding Mr. Ott.

J. R. Wartchow, who has been on military leave of absence to serve in the 715th Railway Operating Battalion, has been appointed supervisor of track on the Iowa division of the Illinois Central, at Rockford, Ill., succeeding **H. A. Depperman,** who has been transferred to the Chicago Terminal division at Chicago, relieving **C. C. Pelley,** assigned to other duties.

Clem Russell, whose promotion to roadmaster on the Tucson Division of the Southern Pacific was reported in the October issue, entered the employ of the Southern Pacific in 1931 as a track walker on the Tucson division. In 1933 he transferred to the Coast division as a track laborer, becoming assistant section foreman in 1934. Later that same year he was advanced to section foreman, remaining in that position until May, 1942, when he was promoted to general track foreman.

Malcolm E. Condon, whose promotion to supervisor of track on the Erie, with headquarters at Campbell Hall, N. Y., was reported in the September issue, was born on June 8, 1908, at Elmira, N. Y., and attended Syracuse University. Mr. Condon entered railway service on June 2, 1931, as a trackman on the Erie, at Elmira, N.Y., later being transferred to the engineering department and serving successively as a rodman, levelman, transitman and chief of corps at Hornell, N.Y., Jersey City, N.J., and Dunmore, Pa. On February 8, 1943, he was appointed general yard foreman at Croxton, N.J., which position he held until his recent promotion to supervisor of track.

Robert S. Fonda, assistant supervisor of track of subdivision No. 8 of the Mohawk division of the New York Central, has been promoted to the newly-created position of general foreman on the Mohawk division, with headquarters as before at Oneida, N.Y., and **Charles Baulkwill,** assistant supervisor of track of subdivision No. 29 of the Eastern division at Brewster, N.Y., has been transferred to Oneida, succeeding Mr. Fonda. **Louis E. Grogan,** assistant supervisor of track of subdivision No. 24 of the Penn-

sylvania division, at Geneva, N.Y., has been transferred to Brewster, replacing Mr. Baulkwill, and **Alfred Morrow,** extra gang foreman on the Pennsylvania division, has been promoted to assistant supervisor of track at Geneva.

Charles W. H. Butcher, whose promotion to track supervisor on the Columbus terminal of the Chesapeake & Ohio, with headquarters at Columbus, Ohio, was reported in the September issue, was born at Morral, Ohio, on May 13, 1902, and entered railway service on April 4, 1924, as a track laborer on the Hocking Valley (now part of the Chesapeake & Ohio) at Morral. On June 19, 1925, he was promoted to section foreman at Morral and was later transferred successively to Harpster, Ohio, Upper Sandusky, Marion, Linworth and again to Upper Sandusky. From November, 1934, to January 13, 1941, Mr. Butcher served alternately as section foreman at various points in Ohio and as extra force foreman in charge of steam ditcher work and subdrainage projects. On the latter date he was advanced to assistant track supervisor at Marion, which position he held until his recent promotion.

Wilmer Wallace, whose promotion to supervisor of track on the Maryland division of the Pennsylvania, at York, Pa., was reported in the November issue, was born at Christiana, Pa., on December 2, 1902, and entered railway service on July 30, 1919, as a trackman on the Pennsylvania. In March, 1923, Mr. Wallace was appointed assistant track foreman at Dillerville, Pa., and in July, 1925, he was advanced to foreman of track at Conewago, Pa., later being transferred to Pomeroy, Pa. In September, 1935, he was promoted to extra gang foreman at Coatesville, and from December 21, 1936, to January 22, 1942, he served as acting general foreman at Lancaster, Pa., and Columbia. On the latter date, Mr. Wallace was advanced to general foreman at Earnest, Pa., and on October 1, 1943, he was promoted to assistant supervisor of track at Washington, D.C., which position he held until his recent promotion to supervisor of track.

Water Service

J. L. Ambrose, general foreman of bridges and buildings of the Illinois division of the Illinois Central, at Champaign, Ill., has been promoted to supervisor of water service of that division, with the same headquarters, a newly created position. The position of general foreman of bridges and buildings at Champaign has been abolished.

Roy L. Cooper, whose promotion to supervisor of water supply of the Russell, Ky., terminal of the Chesapeake & Ohio, was reported in the November issue, was born at Richmond, Ind., on August 19, 1899. After a common school education, he entered railway service with the C. & O. as a signal helper at Peru, Ind., in September, 1923. In March, 1925, he became a motor car mechanic, and three years later he was transferred to the water department as a mechanic. In 1931 he became a road mechanic in the water department, with headquarters at Richmond, Ind., subsequently being advanced to foreman, the position he held at the time of his recent promotion.

Bridge and Building

C. G. Hill, foreman-carpenter on the Chicago Terminal division of the Pennsylvania, has been promoted to assistant master carpenter on the Panhandle division.

Albert C. Tinsley, who has been on military leave of absence, has returned to duty as supervisor of bridges and buildings of the Norfolk division of the Norfolk & Western, at Crewe, Va.

L. M. Farley, master carpenter of the Iowa division of the Chicago, Milwaukee, St. Paul & Pacific, at Marion, Ia., has been transferred to the Kansas City division at Ottumwa, Ia., succeeding **D. Fisher,** who, in turn, has been transferred to Marion, replacing Mr. Farley.

Frederick W. Young, whose promotion to bridge and building master on the Canadian National, with headquarters at London, Ont., was reported in the October issue, was born at Caledonia, Ont., on February 7, 1902, and studied a correspondence course in electrical engineering. He entered railway service on July 20, 1922, as a bridgeman on the Canadian National on the Stratford division, and in 1933 was promoted to carpenter. Mr. Young was advanced to general bridge and building foreman at Stratford, Ont., in 1937, and was transferred to London in 1941. In October, 1943, he was appointed acting bridge and building master of the St. Thomas division, later returning to London as general bridge and building foreman.

Obituary

Roy G. Bush, division engineer on the Missouri Pacific, at Coffeyville, Kan., died recently after an extended illness.

Elbridge A. Johnson, formerly division engineer on the Maine Central, at Portland, Me., died on September 27, 1945.

George K. Thornton, who retired on June 30, 1938, as engineer of track of the Boston & Maine, with headquarters at Boston, Mass., died at Beverly, Mass., on November 18.

Otto Gersbach, who retired in July, 1944, from his position as chief engineer of the Indiana Harbor Belt, the Chicago River & Indiana and the Chicago Junction, died at Montezuma, Ia., on October 30, after a long illness.

Jackson Tampers—A highly interesting and unusual 40-page booklet has been prepared by the Electric Tamper & Equipment Company, Ludington, Mich., which describes in story form the development and use of Jackson tampers. Entitled, Observations on the Jackson Line, the booklet contains numerous illustrations, cartoons and drawings designed to acquaint the reader with the various types of Jackson tampers and the best job-proven methods of operating them.

Association News

Railway Tie Association

As the result of a change from previous plans, as announced in these columns of the October, 1945, issue, the Twenty-Eighth annual convention of the association will be held on May 28-29, 1946, instead of May 7-8. As announced previously, the meeting will be held in the Netherland Plaza Hotel, Cincinnati, Ohio.

National Railway Appliances Association

At a meeting of the Board of Directors of the National Railway Appliances Association, held at Chicago on November 16, it was decided not to hold an exhibit in connection with the annual meeting of the American Railway Engineering Association in March, 1946. Some of the reasons for this decision are that many new products still in the development stage will not be ready for introduction at the time of the A. R. E. A. meeting; that travel, and especially hotel, conditions are expected to continue difficult; and that it was not possible to obtain the facilities for the exhibit that were desired.

Metropolitan Maintenance of Way Club

At the next meeting of the club, which will be held in the Skyline Room of the Hotel Sheraton, New York City, at 12:30 p.m. on December 6, the principal speaker will be J. B. Akers, assistant chief engineer of the Southern, who will talk on the Effect of Engineering Research on Post-War Maintenance Practices. In accordance with the custom in previous years, this meeting is scheduled on the same day as the annual dinner of the New York Railroad Club.

Fifty-seven members and guests attended the last meeting of the club, which was held at the Hotel Governor Clinton on October 25. The feature of this meeting was a question and answer program, conducted by T. E. MacMannis, engineer maintenance of way of the Central Railroad of New Jersey, which provided a number of interesting discussions from members of the club.

Bridge & Building Association

On the call of President Neal D. Howard, the Executive committee of the association will meet in Chicago on December 17, with the primary purpose of selecting the personnel of technical committees for the preparation of reports for presentation at the 1946 annual meeting. Members who have not returned to the secretary the postcards sent to them, indicating their choice of committee assignments, are urged to do so promptly. Consideration will also be given by the Executive committee to the tentative plans already being made for the annual meeting, which, as announced in the November issue, will be held on September 17-19, concurrent with, but independent of, the Roadmasters' Association, at the Hotel Stevens, Chicago.

The complete report of the one-day annual meeting of the association in Chicago on October 17, to be mailed to all members, is in the hands of the printer, and will go forward to members just as soon as available, which should be during the latter half of December.

American Railway Engineering Association

During November meetings were held by three committees, namely, the Committee on Wood Bridges and Trestles, which met at Chicago on November 6, the Committee on Track, which met at Chicago on November 28, and the Committee on Waterproofing, which met at New York on November 15. Also, the Nominating committee held a meeting at Chicago on November 14, and the Board of Direction met at the same place on November 15. One of the steps taken at the meeting of the Board was to change the names of three committees. The Committee on Water Service, Fire Protection and Sanitation becomes the Committee on Water Service and Sanitation; the name of the Special Committee on Waterproofing of Railway Structures is changed to Committee 29—Waterproofing; and the name of the Special Committee on Impact was changed to Committee 30—Impact and Bridge Stresses.

No committee meetings are scheduled for December, but the Committee on Arrangements plans to hold a meeting on December 11 at Chicago to formulate plans for the convention to be held next March. G. R. Westcott, assistant engineer, Missouri Pacific, is chairman of this committee; A. B. Pierce, engineer of water service, Southern, is first vice-chairman, and R. C. Bardwell, superintendent water supply, Chesapeake & Ohio, is second vice-chairman.

Maintenance of Way Club of Chicago

The second fall meeting of the club, with an attendance of 183 members and guests, was held on Monday evening, November 26, in the Ambassador Room of Huyler's Restaurant, Chicago. The main feature of the meeting, following dinner, was an address by C. H. Mottier, vice-president and chief engineer of the Illinois Central System, who spoke on the subject, What Is Ahead of Us? In his remarks, Mr. Mottier treated the subject largely from a managerial standpoint, pointing out the broader problems and possibilities confronting the maintenance of way and structures forces of the railways, but at the same time, he gave recognition to the numerous problems of the man in the field. By way of illustrating what can be done and is being done to solve some of the more important problems confronting the maintenance forces generally, Mr. Mottier cited some of the forward-looking plans and programs being carried out and in prospect on the Illinois Central.

The next meeting of the club, to be held on December 17, a week earlier than usual because of the Christmas holidays, will be a sequel to the November meeting, with the subject for discussion—What Are We Going To Do About It? Giving special consideration to three of the more important phases of roadway and structures maintenance—track, bridges and buildings, and work equipment—the meeting will be addressed by A. G. Reese, district engineer maintenance of way, Chicago, Burlington & Quincy; A. E. Bechtelheimer, bridge engineer, Chicago & North Western; and C. E. Morgan, superintendent of work equipment and welding, Chicago, Milwaukee, St. Paul & Pacific. The meeting will be preceded by the usual dinner, beginning at 6:30 p.m.

B. & B. Supply Men's Association

At a meeting of the Executive committee of the Bridge and Building Supply Men's Association held in Chicago on November 12, the following officers were elected for the ensuing year: president, G. B. Coffey, A. M. Byers Co., Chicago; vice-president, W. Lyle McDaniel, Massey Concrete Products Company, Chicago; secretary, E. C. Gunther, Duff-Norton Mfg. Co., Chicago; treasurer, G. R. Betts, Armco Drainage & Metal Products, Inc., Chicago; directors—(term expiring 1946), E. C. Gunther and G. B. Coffey; (term expiring 1947), G. W. Morrow, Construction Equipment Department, Worthington Pump & Machinery Corp., Chicago; and S. W. Hickey, *Railway Engineering and Maintenance*, Chicago; (term expiring 1948), Howard Mull, Warren Tool Corporation, Chicago; and C. E. Croisant, Lehon Company, Chicago.

Following the election of officers, discussion was carried on looking to the possibility of a joint exhibit of the association with the Track Supply Association in conjunction with the annual meetings of the American Railway Bridge and Building Association and the Roadmasters' and Maintenance of Way Association, to be held in Chicago, September 17-19, 1946.

Roadmasters' Association

President H. E. Kirby has called a meeting of the Executive committee in Chicago on December 7, to transact routine association business and to select the personnel of technical committees for the ensuing year. It is requested that all members who have not expressed their preference for committee assignments by returning the cards sent to them earlier, do so immediately. Consideration will also be given at this meeting to preliminary plans being made for the annual meeting of the association in Chicago on September 17-19, 1946, which will be held at the Hotel Stevens, concurrent with, but independent of, the annual meeting of the American Railway Bridge and Building Association.

During November, all members of the association were sent a report of the one-day annual meeting of the association held in Chicago on September 12, this report, among other things, listing the new officers for the year and including, in full, the five technical committee reports presented before the meeting, together with an abstract of the discussion which followed the presentation of each report.

Supply Trade News

General

The **Ross & White Co.**, Chicago, has moved its offices to Suite 2336-42, Chicago Daily News building.

Personal

Lynn Sawyer, general manager of the pump division of the **Byron Jackson Co.**, Los Angeles, Cal., has been elected a vice-president of the company.

John W. Mock, sales manager of the Turner Brass Works, Sycamore, Ill., has been appointed sales manager of the **Protectoseal Company**, Chicago.

Chester V. Nass, manager of the foundry division of the **Pettibone Mulliken Corp.**, Chicago, has been elected vice-president of the corporation.

Gordon W. Monfort, personnel director of the **Caterpillar Tractor Company**, Peoria, Ill., has been appointed director of the news bureau of that company.

Charles H. Morse III, whose election to vice-president of **Fairbanks, Morse & Co.**, with headquarters at Chicago, was reported in the November issue, is also president of the Inland Utilities Company

Charles H. Morse

(subsidiary of Fairbanks, Morse) and will be in charge of research, traffic, patents and the western pump division of the parent company. Starting as a factory worker in the firm's plant at Three Rivers, Mich., 27 years ago, Mr. Morse worked his way through various departments of the plant, later being promoted to sales engineer, with headquarters at St. Paul, Minn. He subsequently served in similar capacities in Memphis, Tenn., and Kansas City, Mo., until 1935, when he was elected president of the subsidiary concern.

Joseph B. Patton has been appointed manager of industrial relations of the **Oliver Iron & Steel Corp.**, Pittsburgh, Pa. Mr. Patton has been employed for the last 24 years in the industrial relations depart-

(Continued on page 1300)

ment of the Carnegie-Illinois Steel Corporation, at Vandergrift, Pa., his previous experience having been with the Union Pacific and with the American Ever-Ready Battery Company.

J. E. Bushnell has been appointed chief engineer of the **Ransome Machinery Company,** Dunellen, N.J., and **John P. Faver** has been named assistant to general manager and consulting engineer.

Eugene C. Bauer, president of the **Kensington Steel Company,** has been elected a vice-president and director of **Poor & Co.** The Kensington organization is a recently-acquired subsidiary of the latter company.

Lt. W. A. Peck, communications officer of the United States Navy in the European zone, and formerly Chicago representative of the **Rails Company,** has returned to his former position with the Rails Company, with headquarters at 59 E. Van Buren Street, Chicago.

G. V. Woody, manager, since 1934, of the Pittsbugh, Pa., district office of **Allis-Chalmers Manufacturing Corporation,** has been promoted to manager of the company's basic industries department at Milwaukee, Wis., succeeding **R. C. Newhouse,** who has retired after more than 40 years' service. Mr. Newhouse will be retained by Allis-Chalmers as a consulting engineer.

Emanuel Woodings, whose election to vice-chairman of the board of the **Woodings Forge & Tool Co.,** and the **Woodings-Verona Tool Works,** was reported in the November issue, entered the employ of the Verona Tool Works (now a part

Emanuel Woodings

of the Woodings-Verona Tool Works) as an apprentice machinist at the age of 15. After serving in the machine shop 14 years, he was promoted to foreman of the forge shop, subsequently advancing to general manager, vice-president and president. In 1924 Mr. Woodings resigned his position with the Verona Tool Works and formed his own company, the Woodings Forge & Tool Co., which, in 1931, became associated with the Verona Tool Works.

Richard Hannon, Joseph Farley, Robert Cleeland, Glen Rowell and **Stanley Zansitis** have been named field sales engineers of the **Southwark division** of **The Baldwin Locomotive Works,** specializing in the use and application of the SR-4 strain gage. They will maintain headquarters at Boston, Mass., Chicago, New York, Philadelphia, Pa., and Detroit, Mich., respectively.

A. D. Sherwood, who, the past two years, has been serving on active duty in the United States Naval Air Corps, and who, prior to the war, was employed as a salesman of the company at Charlotte, N.C., has been appointed manager of the newly-established Seattle, Wash., office of the **Homelite Corporation,** Port Chester, N. Y. Mr. Sherwood's office is located in the Terminal Sales Building, Seattle, and will service the states of Washington, Oregon and Idaho, with spare parts, repairs, and overhaul work. **R. J. Marschalk** has been appointed manager of the San Francisco, Cal., office of the company, serving northern California and Nevada.

W. H. Woodings, whose election to the presidency of the **Woodings-Verona Tool Works** and the **Woodings Forge & Tool Co.,** with headquarters at Verona, Pa., was also reported in the November issue,

W. H. Woodings

was born at Oakmont, Pa., in 1909. He is a graduate of the Carnegie Institute of Techology, and upon completing his schooling began his business career as a sales representative of the Woodings-Verona organization. Some time later he was elected vice-president of both companies, the position he held at the time of his election to president.

John T. Schneider, assistant manager of the main plant of **Timber Structures, Inc.,** at Portland, Ore., has been elected vice-president in charge of production. **R. B. Fehren,** who formerly managed the firm's eastern fabrication and sales activity, with offices in Trenton, N. J., has been elected vice-president in charge of sales, at Portland. **Andy Toth** has been appointed manager of the newly established Seattle, Wash., sales office.

W. H. Perry has been appointed head of the pump department of the **Milwaukee Machinery Company** of Portland, Ore., newly-appointed distributor in Portland of pumps manufactured by **Fairbanks, Morse & Co. Clyde A. Retter,** of the Seattle branch of Fairbanks-Morse, has been named manager of the pump department of the **Cascade Machinery Company,** Seattle, Wash., which concern has been made distributor in Seattle of Fairbanks-Morse pumping and electrical equipment.

V. G. Scott, production manager of the **Wood Shovel & Tool Co.,** at Piqua, Ohio, has been promoted to manager of sales, with the same headquarters, succeeding **N. T. Jacobs,** whose death was reported in the October issue. Mr. Scott has spent his entire career in the shovel industry, beginning with the Pittsburgh Shovel Company's sales department. Later he resigned to join the sales staff of the Ames-Baldwin-Wyoming Company, with head-

V. G. Scott

quarters at Parkersburg, W.Va., and after serving with that firm for ten years he went with the Wood Shovel & Tool Co., as assistant manager of sales, in January, 1942. In December, 1944, Mr. Scott was advanced to production manager.

James A. Cain, assistant manager of the Pittsburgh division of the **A. M. Byers Company,** Pittsburgh, Pa., has been promoted to manager of the newly-created Atlanta division, and will maintain headquarters at 817 William Oliver Building, Atlanta, Ga. The Atlanta division will handle sales and service matters in Georgia, North Carolina, South Carolina, Florida, Alabama and parts of Tennessee.

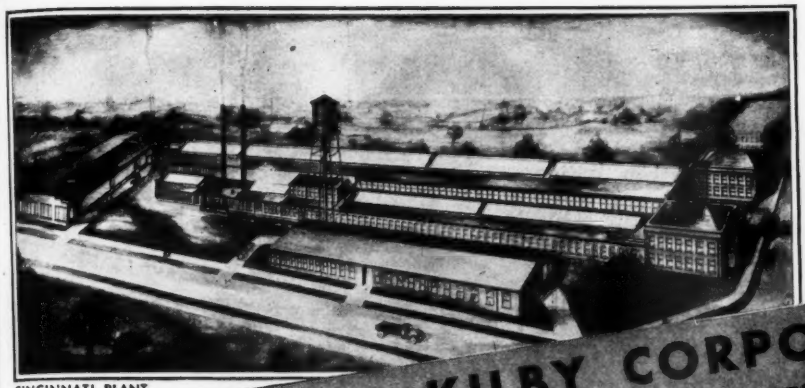
Le Roi Company, Milwaukee, Wis., and its division, Centaur Company, Greenwich, Ohio, announce the establishment of a railroad sales department with headquarters at 327 S. LaSalle St., Chicago. **George M. Hogan,** formerly railroad distributor for Centaur, has been appointed manager representing the entire Le Roi line of portable air compressors, engine-generators, and right-of-way mowers and attachments.

Obituary

Edward Goodman Sperry, vice-president and treasurer of Sperry Products, Inc., Hoboken, N.J., died on November 6.

John A. Wendt, sales manager of the the United States Gypsum Company, died in an Evanston, Ill., hospital on Oct. 19.

J. J. Roberts, who retired in 1941 as treasurer of Roberts & Schaefer Co., Chicago, and who formerly served that company as president, died suddenly at his home in Miami, Fla., on November 3.



CINCINNATI PLANT

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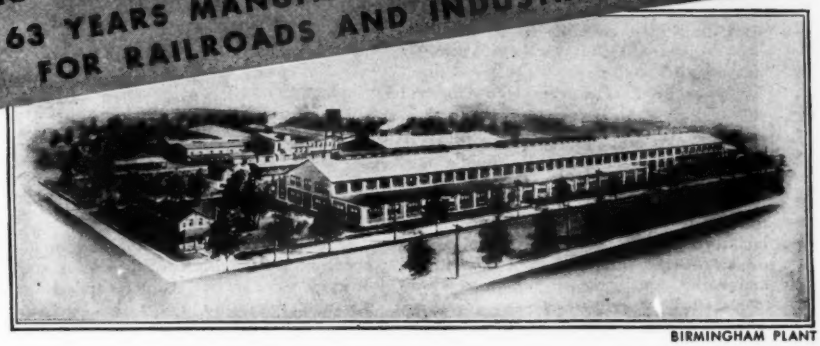
FOR 63 YEARS MANUFACTURER OF TRACK WORK FOR RAILROADS AND INDUSTRIALS!



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Established in 1882, Weir Kilby Corporation is one of the oldest concerns in the country exclusively engaged in the production of special track work.

In 1925 the Weir Frog Co. took over the Kilby Frog & Switch Co. of Birmingham and changed the Company name to Weir Kilby Corporation, perpetuating the Kilby name, so widely known throughout the South.

With plants at Cincinnati and Birmingham, their products include many types of spring frogs; rigid frogs in rail, rail bound and solid manganese constructions; switches, guard rails, guard rail clamps, switch stands and other accessories.

Crossings in built-up rail and manganese constructions have long been furnished by Weir Kilby and more recently they have been a large factor in the development of crossings of heat-treated rail and as a result of their unusual facilities, have gained for this construction, a wide approval.

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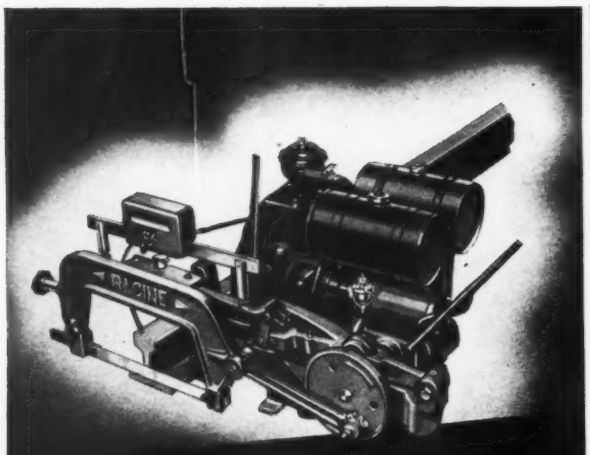

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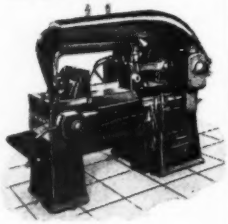

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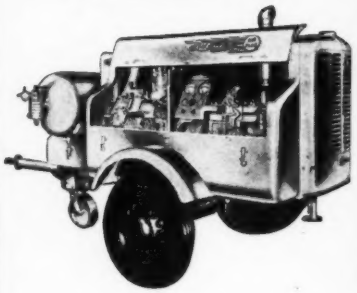

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ALPHABETICAL INDEX TO ADVERTISERS, DECEMBER, 1945

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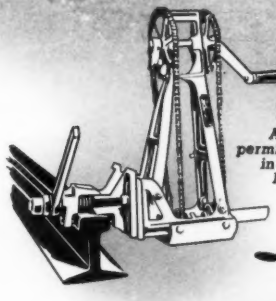

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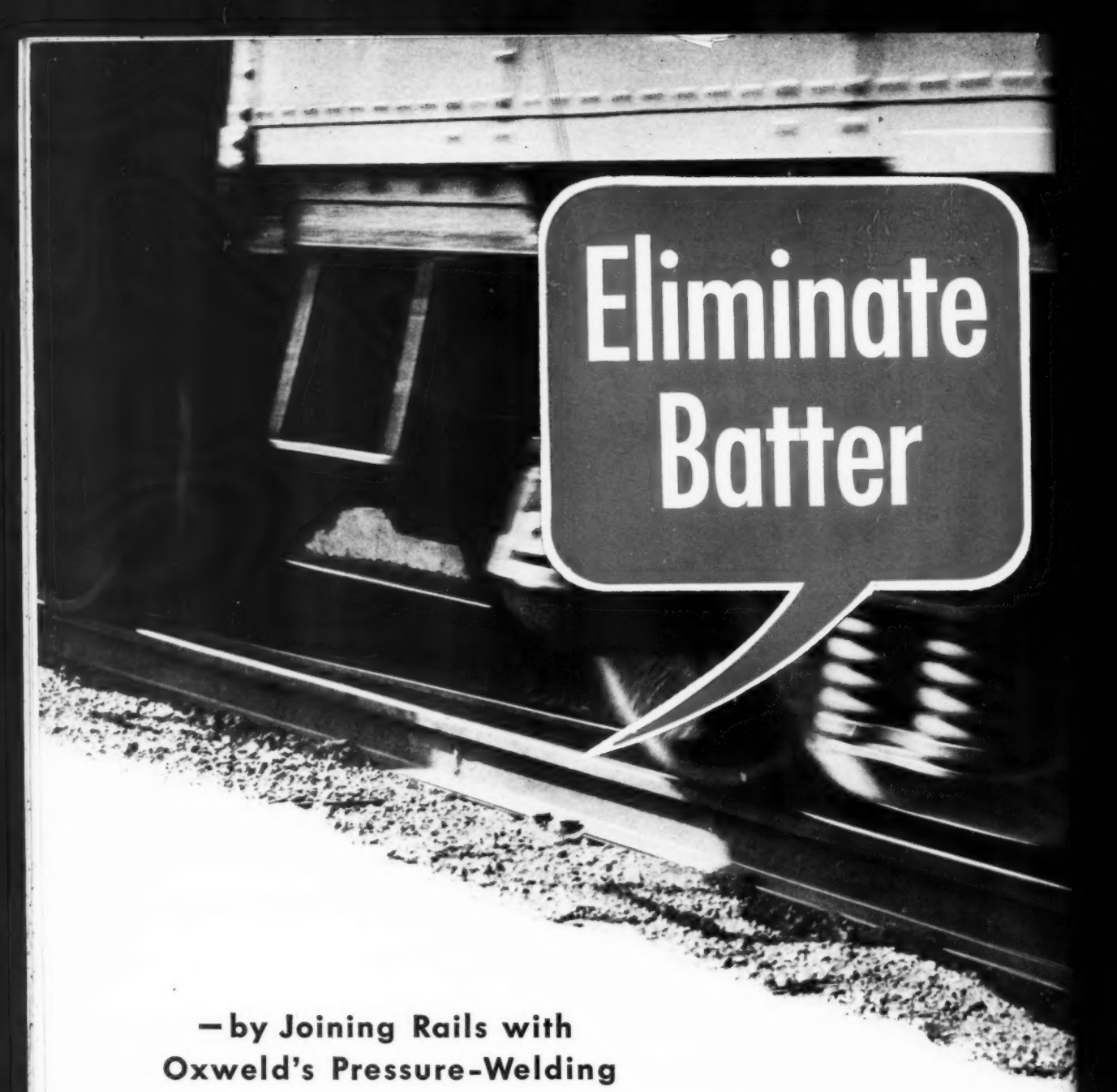

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